October, 1947

EDISON ELECTRIC INSTITUTE BULLETIN

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PUBLISHED MONTHLY BY EDISON ELECTRIC INSTITUTE

ELECTRICAL RESEARCH STATISTICS
THE ELECTRIC LIGHT AND POWER INDUSTRY

Current Statistical Data Covering 100 Per Cent of Industry

July, 1946-1947

SOURCE AND DISPOSAL OF ENERGY—MONTH OF JULY

	1947	1946	%
GENERATION* (Net)			
By Fuel Burning Plants	14,235,702,000	12,203,707,000	+16.7
By Water Power Plants	6,546,253,000	6,416,381,000	+ 2.0
Total Generation	**20,781,955,000**	**18,620,088,000**	**+11.6**
Add—Net Imports Over International Boundaries	136,110,000	172,414,000	−21.1
Less—Company Use	126,453,000	125,653,000	+ 0.6
Less—Energy Used by Producer	361,237,000	234,106,000	.....
Net Energy for Distribution	**20,430,375,000**	**18,432,743,000**	**+10.8**
Losses and Unaccounted for	3,122,425,000	2,824,783,000	+10.5
Sales to Ultimate Customers	**17,307,950,000**	**15,607,960,000**	**+10.9**

CLASSIFICATION OF SALES

NUMBER OF CUSTOMERS—As of July 31st			
Residential or Domestic	30,781,631	29,095,817	+ 5.8
Rural (Distinct Rural Rates)	1,454,857	1,319,624	+10.2
Commercial or Industrial:			
Small Light and Power	4,866,793	4,602,938	+ 5.8
Large Light and Power	185,646	170,980	
Other Customers	130,186	119,327	+ 9.1
Total Ultimate Customers	**37,419,113**	**35,308,686**	**+ 6.0**
KILOWATTHOUR SALES—During Month of July			
Residential or Domestic	3,307,228,000	2,883,398,000	+14.7
Rural (Distinct Rural Rates)	606,326,000	469,910,000	+29.0
Commercial or Industrial			
Small Light and Power	3,123,454,000	2,718,298,000	+14.9
Large Light and Power	9,068,444,000	8,308,685,000	+ 9.1
Street and Highway Lighting	159,811,000	153,945,000	+ 3.8
Other Public Authorities	459,309,000	464,251,000	− 1.1
Railways and Railroads:			
Street and Interurban Railways	329,599,000	345,346,000	− 4.6
Electrified Steam Railroads	208,753,000	212,594,000	− 1.8
Interdepartmental	45,026,000	51,533,000	−12.6
Total to Ultimate Customers	**17,307,950,000**	**15,607,960,000**	**+10.9**
Revenues from Ultimate Customers	**$305,854,600**	**$279,769,300**	**+ 9.3**

RESIDENTIAL OR DOMESTIC SERVICE

AVERAGE CUSTOMER DATA—for 12 months ended July 31st			
Kilowatthours per customer	1,392	1,295	+ 7.5
Average Annual Bill	$43.57	$42.61	+ 2.3
Revenue per Kilowatthour	3.13¢	3.29¢	− 4.9

* By courtesy of the Federal Power Commission.

Vol. 15, No. 10, EDISON ELECTRIC INSTITUTE BULLETIN; published monthly. Entered as second-class matter Aug. 1, 1933, at the post office at Philadelphia, Pa., under the act of March 3, 1879. Publication office, 56th and Chestnut Sts., Philadelphia, Pa. Editorial office, 420 Lexington Ave., New York, N. Y. Subscription rate $2.00 per year in the United States; $3.00 per year in foreign countries.

The Edison Electric Institute does not assume responsibility for, nor necessarily endorse or approve, statements made by contributors to the BULLETIN.

EDISON ELECTRIC INSTITUTE BULLETIN

Volume 15 OCTOBER, 1947 No. 10

The EEI Committees—A Pooling of Talents, Experiences and Brains for a Common Purpose, a Common Goal

ALTHOUGH 1946 was a record year, a year of accomplishments stemming directly from the progressive policies and plain hard work of the electric companies—and this year promises to surpass it in many respects—the industry's leaders show no inclination to sit back and relax.

The electric industry has consistently acted upon the principle that regardless of how efficient electric service has been in the past, *it can be improved*. The committees of the Edison Electric Institute, constantly digging for new and better ways of supplying residential, rural, commercial and industrial customers with electricity, are an example of that principle in action.

It is doubtful if most people in the electric industry, even the leaders and old-timers, are fully aware of the volume of informational material developed by the EEI committees, or fully understand the many ways that information serves not only privately owned electric utilities, but government, related industries, the trade and consumer press and the public.

During 1946, committee findings resulted in purchases of almost a million and a half copies of various pieces published by the Institute, in addition to the reports, handbooks, newsletters and various publications regularly mailed to member companies.

Probably no industry reports so regularly and completely on its performance and works so consistently to solve its problems as the electric industry, voluntarily exchanging its experiences and findings for the good of the customers it serves. And the reports issued by the EEI committees are probably more comprehensive than comparable reports of any other industry.

Every year brings new commercial and technical problems for the committees to tackle and new economic trends which must be taken into account in industry activities.

On this year's 42 committees are more than 900 committeemen. These committeemen, plus the Institute's five officers, the 44 members of the Board of Directors and the 21 members of the Advisory Committee total close to 1,000 electric utility leaders freely cooperating in the advancement of the industry. This figure, in sharp contrast with the number of those serving on EEI Committees ten years ago—less than 300—is perhaps one test of the value of Committee work, not only to the industry as a whole, but, more specifically and tangibly, to the member companies who make it possible for their representative to serve on the Committees.

CHARLES E. OAKES

Chairman of the Board of Directors, EEI, and also President of the Institute. Mr. Oakes is the President of the Pennsylvania Power & Light Co., Allentown, Pa.

To serve on a committee, of course, entails sacrifice. Committee work is frequently performed after regular working hours and may represent an additional responsibility to an already heavy working schedule. It means trips to meetings, often long trips that may come at inconvenient times. The committeeman spends long hard hours of work at conference tables instead of at his desk or at home, for which he receives no apparent immediate personal reward. However, on the other side of the ledger, the committeeman is given an opportunity to serve the entire industry by contributing his knowledge and experience to that of others. That is the way the committees work, a pooling of talents and efforts for the good of the industry.

The committeeman discovers that his contacts with others has broadened his understanding of the industry, that in the give and take of committee discussion he has made new and valuable friends, and that his efficiency as a utility man has increased.

The Board of Directors is the governing body of the Institute, its Chairman being the President of the Institute. Composed largely of chief executives of member companies, the Board elects the officers of the Institute, sets the policies of the Institute and supervises their execution, consulting as occasion may require, with the Advisory Committee on

matters broadly affecting the whole electric utility industry.

The Board of Directors directs all activities of the General Committees and also exercises supervision over the operations of the Accounting, Commercial and Engineering Divisions.

Committee on Codes and Standards

The Committee on Codes and Standards, with H. B. BRYANS of the Philadelphia Electric Co., Philadelphia, Pa., as chairman, is a subcommittee of the Board of Directors and is responsible for activities relating to standards, codes and other technical regulations. An important concern of this subcommittee is the relations between the electric light and power industry and other groups and associations. It supervises the work of electric industry representatives on inter-industry committees with the telephone, telegraph and railroad industries dealing with the coordination of plant facilities.

H. B. BRYANS

Chairman of the Committee on Codes and Standards—President, Philadelphia Electric Co., Philadelphia, Pa.

Another major responsibility of this committee is to maintain liaison with organizations such as the National Electrical Manufacturers Association, the National Fire Prevention Association and many similar business groups.

Additionally this subcommittee is responsible for the electric light and power industry's participation in the 60-odd committees of the American Standards Association which seek to establish standards in the electrical field of national scope.

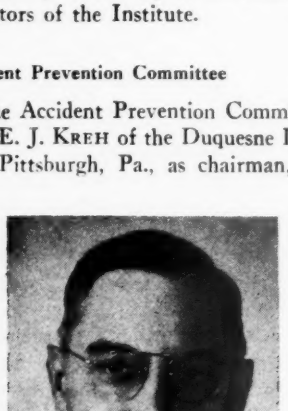
Activities planned for the coming year by the Institute's General Committees and the committees of the Commercial Division, are described on the following pages. Next month's BULLETIN will feature the plans of the Accounting and Engineering Committees. The diversified nature of these projects, and the many benefits which will be derived from them, should make these articles of interest and value to all utility executives, general and departmental.

General Committees Set New Goals for Utility Progress

The General Committees have continuing functions that deal with matters of perennial interest to the electric light and power industry. All General Committees report directly to the Board of Directors of the Institute.

Accident Prevention Committee

The Accident Prevention Committee, with E. J. KREH of the Duquesne Light Co., Pittsburgh, Pa., as chairman, has as its primary objective the prevention of accidents in the industry.



E. J. KREH

Chairman of the Accident Prevention Committee—Manager, Accident Prevention, Duquesne Light Co., Pittsburgh, Pa.

Under the capable leadership of its previous chairman the committee has made available to the industry data which very definitely isolates the principal causes of all fatal accidents which have occurred in the industry during the past five years. The data collected shows "the where," "the why" and "the how" of accident prevention. If intelligently used, it should produce a substantial reduction in accidents.

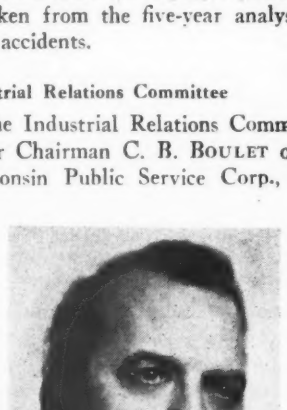
This year the committee will occupy itself principally with activity designed to produce mediums through which this valuable tool will be accepted and used by operating managements and by supervision.

A number of subcommittees are engaged in producing safety educational material, manuals of instruction, safe practice pamphlets and sound-slide and motion picture films.

Three publications of importance are expected to be available in the near future: one, a heart-rending appeal for greater efficiency in life saving procedures and safety based upon the experience recorded in the applications for Edison medals for successful resuscitation following electric shock. Another is a field manual dealing with the application and care of rubber protective equipment, and the third, a sound-slide film which dramatically portrays unsafe practices, the results thereof, and proper procedures as taken from the five-year analysis of fatal accidents.

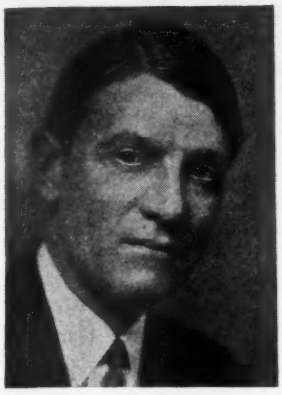
Industrial Relations Committee

The Industrial Relations Committee, under Chairman C. B. BOULET of the Wisconsin Public Service Corp., Mil-



C. B. BOULET

Chairman of the Industrial Relations Committee—Director of Personnel, Wisconsin Public Service Corp., Milwaukee, Wisc.



JAMES F. FOGARTY

Chairman of the Membership Committee—Chairman, Executive and Finance Committee, The North American Co., New York, N. Y.

waukee, Wis., will undertake as its major project this year a study of the procedures through which greater understanding and cooperation can be developed in the utility industry between management, employees and the organizations which represent employees.

Accordingly, the committee in its monthly meetings will engage in discussions of job evaluation, channeling information to employees, employee attitude and opinion surveys, employee and supervisory training, grievance procedures, wage analysis and similar problems.

In addition to its regular meetings, the committee has already arranged a joint two-day session with the Southeastern Electric Exchange in November. The program at this conference will include such subjects as orientation of new employees, effective methods of communication, grievance procedures for unorganized employees, testing for employee selection and a study of the Labor-Management Act of 1947.

The committee is also planning a four-day conference on personnel administrative techniques next April in St. Louis. Personnel executives and their assistants will be invited to discuss topics such as personnel records, apprenticeship training, on-the-job training, job evaluation and employee security.

The committee will also continue to collect and circulate information on current labor negotiations of utilities, wage rates and personnel policies.

Insurance Committee

The Insurance Committee is under the chairmanship of I. M. CARPENTER of Ebasco Services Inc., New York, N. Y. The last 12 months have seen many steps by regulatory bodies toward compliance with Public Law 15, S340—an act to express the intent of the Congress with reference to the regulation of the business of insurance. In many instances there has been a tendency of over-regulation with a resultant adverse effect, both cost and coverage-wise, on utility companies.

During the coming year the Insurance Committee will maintain its close contact with the various rating and regulatory organizations and insurance carriers in an effort to hold these trends to a minimum.

The collection of fire-loss statistics will be continued, it being the opinion of the committee that the experience of the industry should be available. Further study of a formula for the determination of proper insurable values will be carried out.

Close cooperation with other committees of the Institute will be continued.

Membership Committee

The Membership Committee is led by J. F. FOGARTY of the North American Co., New York, N. Y. This committee examines applications for membership in the Institute and reports its recommendations to the Board of Directors.

Prize Awards Committee

With the exception of the Charles A. Coffin Award, which is judged by a special committee, the Prize Awards Committee of the Institute, headed by H. M. SAWYER of the American Gas and Electric Service Corp., New York, N. Y., is

I. M. CARPENTER

Chairman of the Insurance Committee—Manager, Insurance Department, Ebasco Services Inc., New York, N. Y.

H. M. SAWYER

Chairman of the Prize Awards Committee—Vice-President, American Gas & Electric Service Corp., New York, N. Y.

responsible for the consideration of competitive prize awards offered by various donors for sponsorship by the Institute and is responsible for administration, including the appointment of judges of such awards as are approved.

The Thomas W. Martin Rural Electrification Award is offered to the operating company which makes the greatest contribution to the progress of rural electrification. The Claude L. Matthews Valor Awards are offered to electric utility men and women for extraordinary courage and devotion to duty in efforts to maintain important electric service, or to restore service in the shortest possible time.

The Augustus D. Curtis Award is competed for by commercial lighting men on the basis of effective use of high levels of illumination as measured in footcandles and applied in accordance with Better Light-Better Sight principles. The George A. Hughes Award goes to the company with the best record of promotion of residential ranges, either directly or through dealers.

The Laura McCall Award is open to either individuals or departments of electric utilities and awards will be made for ideas or actual achievements of home service work which advances modern homemaking through electrical living.

Prize awards were suspended during the war. This year is the first since 1941 that the full pre-war roster of awards is available and the committee anticipates keen competition among companies and individuals for the honors.

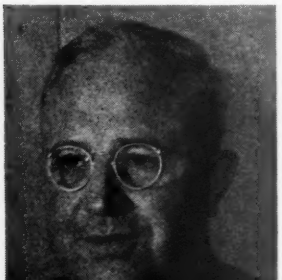
Purchasing and Stores Committee

The Purchasing and Stores Committee is the most recently organized Gen-

eral Committee of the Institute. With R. S. KING of the Union Electric Co. of Missouri, St. Louis, Mo., serving as Chairman, the committee held its first meeting of the current administrative year at Atlanta, Sept. 29-30 and Oct. 1, and a second is scheduled for next spring.

Standing subcommittees are now working on problems connected with purchasing operations, stores operations, salvage, stores equipment and buildings, and stores records. A recently appointed subcommittee on standard packing and description has met with manufacturers and tentatively set up uniform packing standards for 400 items of commonly used line hardware.

An activity that was originated as a result of a discussion at a meeting held last spring is the preparation of occasional bulletins of important changes in purchasing and stores procedures and operating practices as reported by members of the committee and correspondents. Three of these bulletins have been circulated; this work will continue through the current administrative year.



R. S. KING

Chairman of the Purchasing and Stores Committee—General Storekeeper, Union Electric Co. of Missouri, St. Louis, Mo.

Rate Research Committee

The Rate Research Committee, with E. N. STRAIT of Public Utility Engineering and Service Corp., Chicago, Ill., as Chairman, will hold several meetings during the ensuing year devoted to roundtable discussion of various current subjects relating to rates and to consideration of reports which will be submitted by several of its subcommittees.

Among rate problems discussed with interest at its recent September meeting were three-phase service for residences, rates for heat pump operation, affect of rising costs on industrial power rates, load effect of television receivers, peak control of water heating load, fuel clauses in residential rates, and demand-intervals in rate schedules.

E. N. STRAIT

Chairman of the Rate Research Committee—Manager, Rate and Research Division, Public Utility Engineering & Service Corp., Chicago, Ill.

Standing subcommittees continue to investigate rate matters pertaining to indoor climate, demand-intervals, lighting under industrial rates, organization of rate departments, auxiliary and standby service, and profit sharing and sliding-scale rate plans. Newly started subcommittee investigations relate to converted multiple-tenancy industrial and housing projects, electric utility costs, and submetering and combined billing.

Supervision of publication of the Edison Electric Institute Rate Book is one of the regular duties of the Rate Research Committee.

JEAN Y. RAY

Chairman of the Transportation Committee—Head, Motor Vehicle Department, Virginia Electric & Power Co., Richmond, Va.

Statistical Committee

The Statistical Committee, led by Chairman WINSOR MARTIN of the Public Utility Engineering and Service Corp., Chicago, Ill., will continue to supervise the publication of the monthly reports on sales, revenues and kilowatt-hour output, special statistical studies on such subjects as farm electrification and cost of living, and statistical reports on all new developments that affect the electric utility industry.

The committee also plans to review the data assembled from annual reports of contributing companies, now available for the first time since the war. At present the committee is collecting information on demand and capacity from a large sample of the industry.

WINSOR MARTIN

Chairman of the Statistical Committee—Manager, Division of Statistics and Reports, Public Utility Engineering & Service Corp., Chicago, Ill.

As one of its major projects for the coming year, the committee will seek to expand the usefulness of the annual Statistical Bulletin to both the industry and the public.

Continuous contact with the Advisory Committee on Government Questionnaires is maintained and the industry is kept advised on changes in the published data and the report forms of various government agencies.

Transportation Committee

The Transportation Committee, under Chairman JEAN Y. RAY of the Virginia Electric and Power Co., Richmond, Va., works in close collaboration with the Motor Vehicle Committee of the American Gas Association on all problems of motor vehicle operation and maintenance encountered by utilities. A joint subcommittee has largely completed development of standards for small truck

bodies and will undertake next a standard line construction body.

Standing subcommittees cover such important matters as chassis selection and application, body standardization, tools and equipment, maintenance, fuels and lubricants and personnel training.

Recommended layouts for shops and garages, new and improved maintenance practices, reports on the performance of new truck models, recommendations for fuels and lubricants, and training programs for drivers and mechanics will be prepared and circulated by the committee to member companies this year.

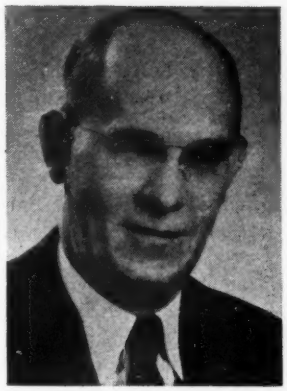
The utility fleet operators' annual conference will be held next spring following the highly successful pattern of the sessions arranged in April, 1947, under the joint sponsorship of the EEI and AGA committees.

Busy Year Ahead for EEI's 18 Commercial Committees

IN preparation for the time when increased sales will be imperatively demanded by utility managements for the protection of their companies' revenue curve, the 18 committees of the Commercial Division of the Edison Electric Institute have scheduled an impressive list of activities for the coming year. The work of these committees during 1947-48 will produce a valuable fund of informative data and promotional materials, which will play an important part in utility sales planning, and will serve as the essential groundwork for future sales programs.

The varied commercial aspects of literally scores of electrical applications in homes, stores, schools, farms, industries and offices will be intensively studied by these committees. Utility sales and commercial managers, advertising and promotional executives, in fact everyone concerned with the coming problem of increasing sales of electricity, have a vital interest in the activities of the commercial committees, which are designed both to aid the industry as a whole, and to assist in solving specific problems of individual companies.

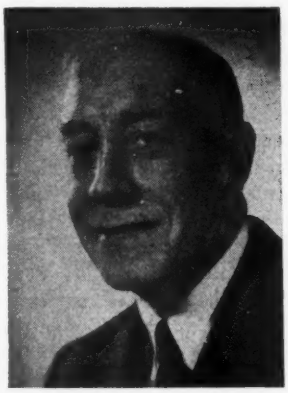
The Commercial Division, which is supervised by RALPH P. WAGNER, Chairman of the Commercial Division General Committee, and Commercial Manager, New York Power & Light Corporation, Albany, N. Y., is organized in four sections.



RALPH WAGNER

Chairman of the Commercial Division General Committee—Commercial Manager, New York Power & Light Corp., Albany, N. Y.

Each section deals with a major market for sales of electricity, and has its own Chairman. Several committees operate within each section, on problems assigned to them by the Section Chairman. Two other commercial committees, Wiring, and Sales Personnel and Training, report directly to the Division Chairman.



R. S. BELL

Chairman of the Sales Personnel and Training Committee—Supervisor of the Merchandise Division, The Commonwealth & Southern Corp., New York, N. Y.

Sales Personnel and Training Committee

The Sales Personnel and Training Committee, with Chairman R. S. BELL of The Commonwealth & Southern Corporation, New York, N. Y., has been organized in three subcommittees.

The Personnel subcommittee, with E. O. George of the Detroit Edison Company serving as Chairman, will study plans for the securing and developing of personnel for utility commercial sales work. Several projects along this line are now being considered by the subcommittee.

Another subcommittee, with H. P. Megargee of the American Gas & Electric Service Corporation as Chairman, has been formed to analyze the need for a sales training film on home lighting, in line with the Planned Lighting Program. If the desirability of such material is indicated, the committee will proceed with preparation.

The third subcommittee, with Chairman E. J. Fitzgerald of the Niagara Hudson Power Corporation, intends to carry out extensive revisions of the Leaders' Guides, which are a part of the EEI Sales Training Course, in accordance with suggestions received from the companies who have used the course.

Wiring and Specifications Committee

The Wiring and Specifications Committee, which reports directly to the Commercial Division General Chairman, has as its Chairman R. F. HARTENSTEIN, of the Ohio Edison Company, Akron, Ohio.

This committee plans to continue with the preparation of its Appliance Installa-

R. F. HARTENSTEIN

Chairman of the Wiring and Specifications Committee—Superintendent of Electric and Steam Sales, Ohio Edison Co., Akron, Ohio.

tion Manual, which will include the wiring methods and installation practices generally accepted in the industry for major appliances that require special installation work. The first section of this Manual, on electric water heaters, has just been published.

Outlines for illustrated lectures to various groups on residential and commercial wiring, recently published by this committee, will be brought to the attention of the industry. The committee plans to cooperate with the Industry Committee on Interior Wiring Design in the preparation of additional wiring handbooks, with the wiring needs of multiple-family dwellings and commercial establishments to receive first consideration. Circuit-breakers and their various appli-

W. GRANT PARRY

Chairman of the Commercial Cooking Committee—Manager, Industrial & Commercial Sales Department, New Jersey Power & Light Co., Dover, N. J.

cations will also be studied by the committee.

Commercial Sales Section

The Commercial Sales Section, with J. S. SCHUCHERT of the Duquesne Light Company, Pittsburgh, Pa., serving as Chairman, is concerned with the commercial market for electric service—stores, schools, offices, institutional buildings, restaurants, in short all sales areas regardless of size, that are not obviously covered by the industrial, farm and residential markets.

Committee assignments in this section are classified by applications of electric service. The section has at present five committees, all of which have agendas well filled with important projects.

Commercial Cooking Committee

The Commercial Cooking Committee,

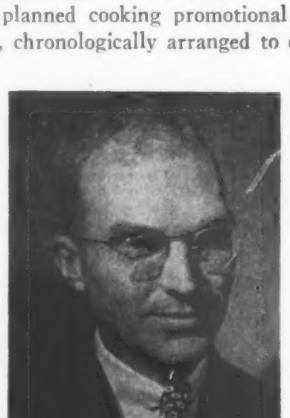
J. S. SCHUCHERT

Chairman of the Commercial Sales Section—Manager, Commercial Sales, Duquesne Light Co., Pittsburgh, Pa.

led by Chairman W. GRANT PARRY, of the New Jersey Power & Light Company, Dover, N. J., is considering the reorganization of the Commercial Electric Cooking Council, in cooperation with equipment manufacturers, to sponsor active promotion in this field. Possible cooperative activities with the Food Service Equipment Industry, Inc., will also be studied.

Analyses and reports on competitive aspects in this market; studies of the distribution and merchandising problems encountered in promotion of commercial cooking, and the policies generally employed in dealing with the problem of servicing appliances, will be prepared by the committee. Continuous market studies and surveys of cooking and baking installations will be made.

A planned cooking promotional program, chronologically arranged to cover



E. B. HASKELL

Chairman of the Market Development Committee—Industrial & Commercial Manager, The United Illuminating Co., New Haven, Conn.

a full year's activity, has been suggested to the committee, and will receive a thorough examination. Recommendations will also be made to the industry on suggested personnel, training and operation of suitable facilities to prepare "planned commercial electric kitchen layouts."

Commercial Heating and Motor Applications Committee

The Commercial Heating and Motor Applications Committee, whose Chairman is P. D. LAWRENCE, of the Virginia Electric & Power Company, Richmond, Va., plans to cooperate with other Institute committees in the study of the electric heat pump, so far as commercial applications of this device are concerned. Air conditioning will be another major phase of this committee's activity, with

P. D. LAWRENCE

Chairman of the Heating and Motor Applications Committee—Director of Commercial and Industrial Sales, Virginia Electric & Power Co., Richmond, Va.

new equipment, market opportunities and sales methods receiving particular attention.

Consideration will be given to the need for an overall promotional program on the use of electric service in air conditioning of all types, and to a report on the opportunities and sales programs presented in the field of electric heating for commercial applications, which includes water heating, spot and strip heating, infra-red and electronic heating.

Other activities on this committee's agenda are the study of commercial refrigeration, with emphasis on the distribution of frozen foods, a study of locker plants, and the use of germicidal lamps in commercial establishments.

Market Development Committee

The Market Development Committee, with EBEN B. HASKELL, of the United

H. B. GOULD

Chairman of the Commercial Lighting Committee—Commercial Manager, Youngstown Division, Ohio Edison Co., Youngstown, O.

Illuminating Company, New Haven, Conn., serving as Chairman, devotes its time to the commercial market in its broad aspects, rather than the study of specific equipment and applications. Sales research, including market analyses and customer load research, is an important part of the work of this committee, with special attention to be given to the problem of disseminating the results of sales research work to executives, as well as to men in the field.

The development of good will and improved public relations in the commercial market is another major matter of study for the committee. General methods of sales promotion, including advertising ideas, types of media used, group contacts, public demonstrations and similar programs, will be analyzed.

Policies employed in the industry in handling servicing responsibilities, connections, rate explanations, contracts and similar problems will be examined during the year. General sales operating procedures, including sales control methods and customer record systems, form another valuable part of this committee's work.

Commercial Lighting Committee

The Commercial Lighting Committee, headed by Chairman H. B. GOULD of the Ohio Edison Company, Youngstown, Ohio, will encourage the cooperative support and widespread use of the Institute's Planned Lighting Program. Case studies of successful promotional methods and outstanding commercial lighting installations resulting from this program will be compiled, and made available by the committee.

The committee will prepare studies and reports on technical aspects of commercial lighting, including light sources, equipment designs and lighting applications. Data on expanded market opportunities, with particular respect to necessity lighting vs. Planned Lighting, will be collected, in cooperation with manufacturers, utilities and trade groups.

The Commercial Lighting Committee will assist in the development of meritorious programs in this field, and will work with the Better Light-Better Sight Bureau, the Illuminating Engineering Society and other associations in this activity.

A suggestion for an annual EEI award, based upon the success achieved with Planned Lighting promotions, will be considered by the committee.

Street Lighting Coordination Committee

The Street Lighting Coordination Committee, under its Chairman BRUCE JENSEN, of Public Service Electric & Gas Company, Newark, N. J., plans to prepare and distribute a comprehensive report to the industry, which will be based upon the data on street lighting practice collected in its recent questionnaire. Comparisons of operating methods and experiences, rates, breakage problem data and other pertinent information will be provided by the committee in its report.

The committee will continue with its studies of possible lines of action, on a national basis, to help solve typical street lighting problems, and to assist individual operating companies with their local questions.

BRUCE JENSEN

Chairman of the Street Lighting Coordination Committee — General Lighting Representative, Public Service Electric & Gas Co., Newark, N. J.

E. C. EASTER

Chairman of the Farm Section—Manager, Rural and Towns Division, Alabama Power Co., Birmingham, Ala.

Successful experiences and constructive suggestions of member companies will be culled to enable the committee to publish more helpful technical data, promotional ideas and operating methods in the street lighting field. The committee will coordinate its promotional and technical work with that of trade groups and individual manufacturers.

Farm Section

The Farm Section, with E. C. EASTER, of the Alabama Power Company, Birmingham, Ala., serving as Chairman, has its committees primed for an exceptionally active year, in keeping with the wider use of electricity in agriculture, and the increased numbers of farmers being reached by power lines.

In preparation as a section project is a Farm Electrification Manual, which is patterned after the Power Sales Manual, and is intended to bring electric company rural representatives up-to-date, accurate information on farm uses of electricity. The Manual has already been released to the industry, with additional chapters to be made available as a continuing project.

The formation of state farm electrification councils, which bring together all groups interested in the use of electricity on the farm, is also a matter of continuing interest to the section, as is the organization of state agricultural college and other research programs into all phases of farm electrification.

Agricultural Development Committee

The Agricultural Development Committee, under the leadership of its new Chairman, C. H. LEATHAM, of the Monongahela Power Company, Fairmont, W. Va., plans to collect and analyze information on the various methods used, and activities presently sponsored, by electric companies who are engaged in working with farm groups and agencies in the interest of better agriculture.

The committee plans to serve as a clearing-house for tested ideas and successful programs in the field of agricultural development. It will attempt to encourage a more widespread interest in the utility industry in the problems of farm customers, and in bringing about more joint programs to improve agricultural conditions.

C. H. LEATHAM

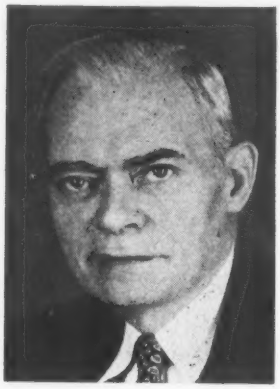
Chairman of the Agricultural Development Committee — Vice-President, Monongahela Power Co., Fairmont, W. Va.

The committee intends to publish at intervals the results of its studies, so that the methods employed successfully by individual companies in agricultural development will be available for the benefit of others in planning their programs.

Farm Utilization Committee

The Farm Utilization Committee, with J. C. CAHILL, of The Detroit Edison Company, Detroit, Mich., continuing as Chairman, plans to assist in developing the use of the Institute's In-Service Training Program in farm electrification for agricultural workers, and will help to make this course available to colleges, state extension service agencies and other interested organizations.

The committee is considering the preparation of a comprehensive plan



J. R. HARTMAN

Chairman of the Industrial Power and Heating Section—Vice-President, The Cincinnati Gas & Electric Co., Cincinnati, Ohio.

book, which will outline a recommended line of approach to better farm utilization of electricity.

Another project on this committee's agenda is the development, in cooperation with equipment manufacturers, of methods to spread knowledge of electrical applications in agriculture, and will stress the necessary improvement in farmstead wiring, to handle an expected increase in the use of electricity by most farmers. Plans for the effective cooperation of member companies with local and state 4-H club activities will also receive the committee's attention.

Industrial Power and Heating Section

The Industrial Power and Heating Section, with J. R. HARTMAN, of The Cincinnati Gas & Electric Company, Cincinnati, Ohio, serving as Chairman, and R. G. ELY, Public Service Electric & Gas Company, Newark, N. J., as Vice-Chairman, is organized in three main committees, with several subcommittees, and other committees organized for specific tasks.

The section meets as a whole, and as such works on new and revised sections of the Power Sales Manual, which has been of great aid to the industry. Plans are now being made to give wider distribution to information on new applications for electrical energy, and on new developments in competition.

J. C. CAHILL

Chairman of the Farm Utilization Committee—District Coordinator, The Detroit Edison Co., Detroit, Mich.

Competitive Service Committee

The Competitive Service Committee, under the direction of Chairman THOMAS BURNS, of the American Gas and Electric Service Corporation, New York, N. Y., will collect, digest and disseminate to the industry pertinent facts relative to competitive forms of power, and related situations.

THOMAS BURNS

Chairman, Competitive Service Committee—Executive Engineer, American Gas & Electric Service Corp., New York, N. Y.

Progress in the development of new equipment using competitive sources of energy, will receive the committee's continual attention. The committee will continue to study trends in the cost of equipment, fuel, labor, taxes and other costs, which may have a bearing on the competitive situation.

General Power and Heating Committee

The General Power and Heating Committee, with W. T. RICHARDS, of the Indianapolis Power and Light Com-

pany, Indianapolis, Ind., as Chairman, will study and report to member companies on new developments in all industrial uses of electric power. These include heating, melting, welding, high frequency heating, industrial refrigeration, air conditioning and ventilation, infra-red heating, motor applications and controls.

Particular attention will be given by the committee to the findings of research projects, that are now being undertaken by various types of industries, in a search for new applications for electric power. A subcommittee is making good progress in a comprehensive study of various programs now being sponsored by electric companies and others in industrial development activities, and is expected to prepare a report on this project during the year.

W. T. RICHARDS

Chairman of the General Power & Heating Committee — Director of Power Sales, Indianapolis Power & Light Co, Indianapolis, Ind.

Industrial Lighting Committee

The Industrial Lighting Committee, under Chairman MAXWELL COLE, of the Philadelphia Electric Company, Philadelphia, Pa., will promote the use of the Planned Lighting Program, and will study both the methods used by electric companies in applying this program in their areas, and the results accomplished. New developments in lighting will be followed, and studies conducted to learn how new light sources and equipment can be employed to advantage in industrial lighting.

The committee is considering the organization of a conference on Industrial Lighting, which would be designed to give the power engineer facts to assist him in developing maximum use of light in industry.

Case histories showing the benefits which customers derive from improved industrial lighting will be collected. Wherever possible, factual data such as increased production, lower operating costs, reduction in accidents, and improvement in employee morale, will be gathered and made available to the industry.

J. M. STEDMAN

Chairman of the Residential Section—General Commercial Manager, Pennsylvania Power & Light Co., Allentown, Pa.

Residential Section

The Residential Section, headed by Chairman J. M. STEDMAN, of the Pennsylvania Power & Light Company, Allentown, Pa., will prepare through its committees much market information and a group of promotional aids that will be of invaluable assistance to residential sales staffs. All phases of the residential market will be considered by these committees during the year, which will be one of intense activity.

Dealer Coordination Committee

The Dealer Coordination Committee, with R. H. REHRER of the New Jersey Power & Light Company, Dover, N. J., as its new Chairman, has for its field of activity the collection and consideration of methods and plans used by electric companies to maintain good dealer relations, and to secure widespread retailers' support for company programs.

Specific company activities that have been proven successful in this field will be studied by the committee, and made available to member companies.

As a continuing project, the committee will serve as a clearinghouse for information on all matters pertaining to dealer coordination. Problems involved in the distribution of prospects to cooperating retailers, the display of dealer appliances in utility commercial offices, securing dealer cooperation in making out regular sales reports and other subjects will be analyzed in the light of currently successful practices by the committee during the year.

R. H. REHRER

Chairman of the Dealer Coordination Committee—Residential Sales Manager, New Jersey Power & Light Co., Dover, N. J.

MAXWELL COLE

Chairman of the Industrial Lighting Committee—Manager, Market Studies and Service Division, Philadelphia Electric Co., Philadelphia, Pa.

Electric Kitchen and Laundry Committee

The Electric Kitchen and Laundry Committee, headed by Chairman J. F.

J. F. BURT

Chairman of the Electric Kitchen and Laundry Committee—General Sales Manager, Western Massachusetts Electric Co., Pittsfield, Mass.

BURT of the Western Massachusetts Electric Company, Pittsfield, Mass., plans to cooperate with all allied interests in the development of a continuous and comprehensive sales promotional program, designed to sell complete electric kitchens and laundries, electric kitchen and laundry "centers," and individual appliances, in both the new home and home modernization markets.

A long-term project which will require much time to crystallize, this program is now in the tentative planning stage. It is not expected to be ready for use by the industry until the latter part of 1948.

The committee will move to establish greater unity of effort in the development of the electric kitchen and laundry market, and in the promotion of the major appliances in this field. The many advantages of proper planning of the electric kitchen and laundry will be stressed in a program of public education in this subject, which the committee plans to prepare and sponsor.

MISS LUCILE JOHNSON

Chairman of the Home Service Committee—Director of Home Service, Public Service Co. of Oklahoma, Tulsa, Okla.

Electric Water Heating Committee

The Electric Water Heating Committee, with TOM D. FULFORD of the Virginia Electric and Power Company, Richmond, Va., serving as Chairman, plans to work toward further simplification in the standards for electric water heaters, with special attention to be given to the question of eliminating some of the various sizes of water heating elements.

The committee plans to cooperate with manufacturers in efforts to make water heaters available to additional sections of the public. Capitalizing on the experimental and engineering work done on this appliance in the past, the committee will devote a good part of its time to the development of sales promotional methods, which will be aimed primarily at encouraging increased public understanding of the advantages of electric water heating service.

Home Service Committee

The Home Service Committee, with its new Chairman, MISS LUCILE JOHNSON of the Public Service Company of Oklahoma, Tulsa, Okla., plans to disseminate information on all new and effective methods to make home service activities even more effective in producing customer satisfaction with all types of residential appliances.

The "Home Service Exchange," a committee bulletin, will be published frequently during the year, and will provide invaluable data on home service techniques, which is secured from utility companies, women's magazines, educational institutions and other sources.

The "Parade of Demonstration Ideas" will be continued by the committee, and will present the latest methods developed for demonstration of cooking and homemaking techniques, to all those interested in home service work. Regional Home Service Conferences, for interchange of ideas and information in this field, will also be considered by the committee.

Indoor Climate Committee

The Indoor Climate Committee, under its new Chairman, H. F. CARR of the Consolidated Gas Electric Light and Power Company, Baltimore, Md., will continue to devote a major portion of its activity to the heat pump, and its application to residences.

TOM D. FULFORD

Chairman of the Electric Water Heating Committee—General Sales Manager, Virginia Electric & Power Co., Richmond, Va.

The first section of a comprehensive report on the heat pump has been distributed to the member companies of the Institute, and the committee plans to add new sections at intervals, in order that the industry may be kept informed of the development of this appliance.

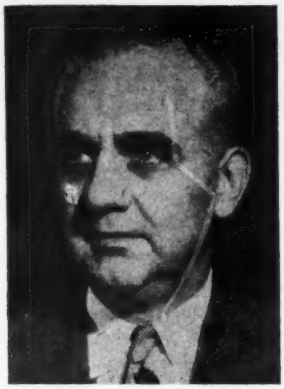
In addition to the heat pump, attention will be given to electrostatic air cleaning, dehumidification, unit air conditioning and attic ventilation.

Residential Lighting Committee

The Residential Lighting Committee, with H. A. STROUD of the Monongahela Power Company, Fairmont, W. Va., serving as Chairman, plans to continue its efforts on the residential Planned Lighting Program, which has now been

H. F. CARR

Chairman of the Indoor Climate Committee—Consolidated Gas Electric Light and Power Co., Baltimore, Md.



H. A. STROUD

Chairman of the Residential Lighting Committee—Promotion Manager, Monongahela Power Co., Fairmont, W. Va.

released to the industry. The committee will encourage intensive use of the program, and will consider and recommend new materials that may become desirable, as a result of the experience of member companies with the promotion of Planned Lighting in the field.

Additional efforts and methods by which the sale of certified lamps and fixtures can be speeded will be studied and proposed by the committee, with possible recommendations to be made to the manufacturer and distributor groups.

The committee will continue to work with the Sales Personnel and Training Committee in the preparation of additional material for the EEI Sales Training Program on training of home lighting sales personnel.

Ridout Becomes EEI Rural Service Manager

William J. Ridout, agricultural engineer with the North Carolina Extension Service, has become the EEI's new Rural Service Manager. In his new position, Mr. Ridout will supervise the farm electrification activities of the EEI, and will assist the various committees of the Institute's Farm Section.

Born in Virginia, Mr. Ridout graduated from Virginia Polytechnic Institute in 1939, with a B S degree in agricultural engineering. He went with the Kentucky and West Virginia Power Company as rural service engineer, and held this position until 1940, when he became power engineer for the East Tennessee Light and Power Company.

In 1941 Mr. Ridout assumed the post of extension agricultural engineer for the South Carolina Extension Service, at Clemson College, S. C. He became an ensign in the Navy in 1944, and saw service in the Pacific. After his release in 1945, he was employed by the North Carolina Extension Service, at Raleigh, N. C., as extension agricultural engineer in charge of rural electrification.

Mr. Ridout succeeds Roy W. Godley as the EEI's Rural Service Manager.

Freedom Train Reminds U. S. Citizens of Democratic Ideals

LAST month, on the 160th anniversary of the signing of the Constitution, the Freedom Train started from Philadelphia on a year-long tour of the forty-eight states, the beginning of the greatest peacetime patriotic program in the country's history. With its precious load of more than 100 American historical documents, the seven-car train will visit 300 U. S. Communities.

The documents all relate to the development of the American philosophy of individual liberty, and all are originals. They come from both private and government collections and the trip of the Freedom Train is the first time these important historical landmarks have been brought together.

Included among the documents are the Bill of Rights, the Emancipation Proclamation, a contemporary manuscript copy of the Declaration of Independence attested by Benjamin Franklin, orders from the Continental Congress to General George Washington, the log of the U.S.S. *Constitution,* a letter from the King of Siam to President Lincoln, and many other papers of both social and historical interest.

In every community visitors to the train will participate in ceremonies of rededication to the American ideal of liberty for every individual citizen. It is hoped that the ceremonies and the famous documents will re-awaken in many people an appreciation of America's political heritage.

Apparently the concept of an exhibit of historical documents originated with Attorney General Tom Clark about a year ago. The Attorney General was very much concerned over what seemed to him the complacency with which his fellow citizens regarded their hard-won political rights. An exhibit of documents, he suggested, would dramatically remind Americans of their traditional liberties.

The suggestion, endorsed by President Truman, resulted in a meeting at the White House last May of more than 200 leaders of finance, industry, labor, business and government. The meeting transformed the Attorney General's vague concept into the idea of the Freedom Train.

To carry out the project, the meeting organized the American Heritage Foundation and elected Winthrop W. Aldrich, chairman of the board of Chase National Bank, New York, as chairman of the board of trustees, and Thomas D'Arcy Brophy, advertising executive, as president. The Foundation's headquarters are at 17 East 45 Street, New York.

The 36 members of the Foundation's board of trustees are leaders from almost all phases of American life. The organization is non-partisan, non-political, and non-controversial.

Mr. Aldrich, in commenting on the objectives of the Foundation, said, "The months and years immediately before us will put our democratic way of life to a critical test. To meet it, the American people must know, understand, and appreciate the system of government which has bestowed its blessings upon them. We propose . . . a national program that will emphasize and dramatize the common heritage of every American—our system of democratic government based on individual freedom."

Mr. Thomas D'A. Brophy summed up the organizations four major objectives as: a more active participation by citizens in the process of democracy, increased awareness of our individual rights and liberties as guaranteed by the Constitution, an augmented pride in our past, and a wider recognition of our obligations to the world to maintain our free institutions as an example of democracy preserving the rights and dignity of the individual.

McGregor Smith, president of the Florida Power and Light Company, is a member of the Foundation's board of trustees, and also a member of the board of directors of the Edison Electric Institute. The estimated cost of sending the Freedom Train on its long trip is $900,000. Contributions from industry, labor and private citizens will support the entire venture. There is to be no government financial support whatsoever. Mr. Smith is presently soliciting subscriptions from the electric companies.

The Association of American Railroads is probably the largest contributor to the project. The diesel-electric locomotive was provided by the American Locomotive Company and General Elec-

(*Continued on page* 383)

Power Industry Survey Estimates 5 Per Cent Margin of Capacity Above Peak Demands This Winter

Huge Five-Year Construction Program Now Starting to Catch Up with Plant Expansion Deficiency Caused by Wartime Interruption of Construction

THE findings of a survey of the Nation's power supply and the growth of power demand, just completed by a committee of the electric industry's power experts have been announced by Charles E. Oakes, President of the Edison Electric Institute.

The survey showed for the country as a whole a 5 per cent average margin of reserve generating capacity for this winter's peak demand, narrowing by 2 or 3 per cent earlier estimates. It established that installation of new generating capacity has greatly accelerated and is now proceeding at a rate of about 400,000 kw a month, a figure expected to raise for 1948 the country-wide average margin of reserve to 8 per cent. It also found that the total amount of new capacity to be added in the five-year period 1947-1951 inclusive will reach 18,000,000 kw, raising by two million the total previously compiled. Of this sum 15,000,000 kw will be added by the business-managed electric companies. This huge construction program will take care of increased load growth and restore normal margins of reserve capacity.

Since the bulk of this is steam power it is being added in half the time that new hydro-electric developments could be built.

The committee making the survey was composed mainly of the group of top flight electrical engineers and power specialists who served, while on leave from their companies, the WPB in a similar capacity during the war.

Barring extraordinary combination of equipment failures which would result in localized and temporary load curtailment, in the judgment of the experts the present heavy power demands will continue to be supplied except possibly in the case of some smaller and isolated power systems.

Mr. Oakes' full statement follows:

A survey of the Nation's power supply, the rate of growth of power demand, and progress in installing additional generating capacity has just been completed by a committee of power experts. Since the electric industry is faced with reserves far short of normal because of the wartime halt of its construction program and the rapid postwar expansion of electric power consumption, and because of the abnormal lengthened delivery period for heavy equipment, the Edison Electric Institute is keeping close watch on these developments.

Briefly, the latest survey shows for the country as a whole a margin of reserve capacity of approximately 5 per cent above the winter peak demand expected to occur in December. This 5 per cent is an average figure but the variation in the different regions and areas of the country is not large. Some sections of the country, as in the case of California, the Southwest and parts of the Southeast, experience in the summer months the year's highest demands for electricity.

For the year 1948 the survey showed a country-wide average margin of reserves of generating capacity over peak demands of about 8 per cent, a small improvement over the expected December 1947 margin.

These percentage figures mean, in the judgment of the experts, that barring an extraordinary combination of equipment failures which would result in localized and temporary load curtailment, present power demands of customers will be supplied except in the case of some of the smaller, isolated power systems.

As a precautionary measure against equipment failures, many companies have already arranged or will no doubt arrange ahead of time with some large power customers which can be curtailed for a brief period with a minimum of loss, to cut down their power consumption, should such necessity arise. They will also alert those customers who are buying power on interruptible contracts when they are to be cut off, so as to assure the fact that retail customers and all essential customers shall not be disturbed in the full use of electricity.

Rainfall in most of the areas east of the Rockies has been deficient since July. If the usual fall rains occur in this wide area, it will ease somewhat the expected narrow margin between total generating capacity and total power demand. Normal rainfall can also help to ease the narrow margins of spare capacity still expected in some sections of the country during the summer peak loads and the winter peak loads of 1948.

Installation of new generating capacity two months ago caught up with the growth of power demand, and at the present time is proceeding at the rate of 400,000 kw per month, which is about 20 per cent above the estimated rate of load growth. In 1948 new generating capacity installed is expected to exceed the growth of power demand by about 2 million kw. Total installed capacity which at the end of 1946 was 50,300,000 kw, is expected to be a little over 52,000,000 kw in December 1947 and about 57,000,000 kw by the end of 1948.

Total peak power demand in December 1947 is expected to be about 49,000,000 kw and at the end of 1948 to be of the order of 52,000,000 kw. Thus, in most power areas of the country the margin of reserves will improve appreciably in 1948. In some this improvement will not occur until 1949. By 1950 in some areas and 1951 or 1952 in others, it is expected that normal reserves of 15 to 25 per cent will have been re-established.

The recent survey shows that total capacity to be added during the 5-year period from 1947 to 1951 inclusive, now amounts to 18,000,000 kw, of which over 15,000,000 kw will be installed by privately owned power companies. This will be an increase in the 5-year period of 37½ per cent above the total installation constructed in the previous 65 years. Since the bulk of the new generating capacity is steam powered it is being added in half the time that new hydro-electric developments could be built.

Deliveries of power equipment are now scheduled as follows: 1947, 3,257,000 kw; 1948, 5,215,000 kw; 1949, 4,915,000 kw; 1950; 3,383,000 kw; 1951 (so far ordered), 1,000,000 kw. Steam power constitutes about 15½ million kw; hydro power about 2½ million kw.

Electricity Production in U. S. Now at Rate of 300 Billion Kwhr Per Year

Production Six Times Greater Than in Any Other Country—
Energy Is Equivalent to Labor of 4½ Billion Men

As of October 1, 1947, production of electricity, by all generating equipment in the United States, was at the rate of 300 billion kwhr per year. This amount is almost exactly one half of total world electricity generation in 1946, and is more than six times greater than production by any other country.

Energy represented by the record twelve-month electric production in this country is equivalent to a year's labor, on an eight-hour day basis, of four and one-half billion men—more than twice the world's population.

Present production is exactly double that of 1937, when total generation, 150 billion kwhr, highest prewar figure, was reached. The gain of 100 per cent over 1937 in electricity generated was accomplished with an increase in the ten year period of only 37 per cent in generating facilities.

On a nationwide average, the householder as of October, 1947, used in his home 1400 kwhr a year. Ten years ago his average use was 800. In 1927 it was 446 and at the beginning of our participation in the first World War it was 268.

Electric Price Goes Down

Today the average revenue from domestic electricity sales is three and one-tenth of a cent per kwhr. Ten years ago it was four and three-tenths of a cent. In 1927 it was six and eight-tenths. The curve of electricity costs when plotted on a chart shows a practically unbroken slope downward from 24 cents per kwhr, the price when Edison opened his first electric power station in 1882.

The electric industry today has a total of 37,500,000 customers in all classifications. Three and three-quarter millions have been added since V-J Day.

At present, it is estimated that 92 per cent of occupied dwellings, including those in rural areas and small villages, are using electric service, with service available to an additional 3 per cent.

Total production by all sources, including industrial plants, street railways, etc., has averaged around 275 billion kwhr for each of the past four years and is expected to exceed 300 billion for the calendar year 1947. Production in 1937 of 150 billion kwhr by all sources was almost entirely for non-military use. At the peak of the war 42 per cent of electricity generated by the electric industry was absorbed by war production, while now practically all is again used for peace-time purposes.

$5 Billion For New Capacity

A $5 billion construction program of the privately operated electric power companies, now well under way, will add about 15,000,000 kw of additional generating capacity to the lines of the business-managed electric companies during the next four and a half years. This represents 5 million kw more new generating capacity than is installed in all the governmentally and municipally-owned plants in the U. S. A., including the TVA, Boulder Dam and Bonneville establishments. Additional construction by other electricity producers will bring the total of all new construction to more than 18,000,000 kw of capacity within the next five years.

Size of New Generators

A review of the published reports of orders for new generating equipment reveals some trends worthy of mention. An analysis of 12,500,000 kw of generating capacity of the 15 million on order by the business-managed electric companies and on which details are available, shows 11,750,000 are in steam units, about 630,000 kw are in hydro units, and about 120,000 kw are in internal combustion units.

Internal combustion engines in the electric industry in 1946 accounted for 1 per cent of the total kilowatthours produced. Most of this type of capacity now being added by the utility systems is for peak load and standby purposes.

Of 264 steam units with a combined capacity of about 11,750,000 kw to be installed by electric companies, and on which information is available, 66 units or exactly 25 per cent, exceed 60,000 kw of capacity. The average size for the 264 units is 44.5 thousand kilowatts. The capacity breakdown for the 264 units follows:

Number of Units	*Rated kw Capacity (In Thousands)*	*Total kw Rating*
86	10 to 29	1,190,000
112	30 to 60	4,700,000
43	61 to 90	3,200,000
23	over 90	2,660,000
264		11,750,000

Approximately 75 per cent of the new units are going into existing stations.

Increased Demand for Electricity

During the war full service was maintained to all customers. Despite the fact that postwar growth of demand for electricity has narrowed the industry's margin of spare and reserve generating capacity, it is expected that practically all customer demands will be met this year and in the years following.

A considerable part of the increasing demand for electricity can be attributed to natural growth through high industrial activity, increased use in homes, and new customers added; nevertheless, it is most significant that while the industry is carrying forward a large construction program it is also actively engaged with several extensive sales programs designed to promote and stimulate greatly increased use of electricity for residential, commercial, industrial and agricultural purposes. For an example: it is estimated by sponsors of one such commercial effort, the Planned Lighting Program, that for really adequate lighting the homes of the country need four times the light they now have, stores need six times, factories four times, office buildings five times and schools seven times. The overall objective of the program is to stimulate the fulfillment of these needs.

The facts just recited point up the more notable aspects of an industry which is unique in its history of price to

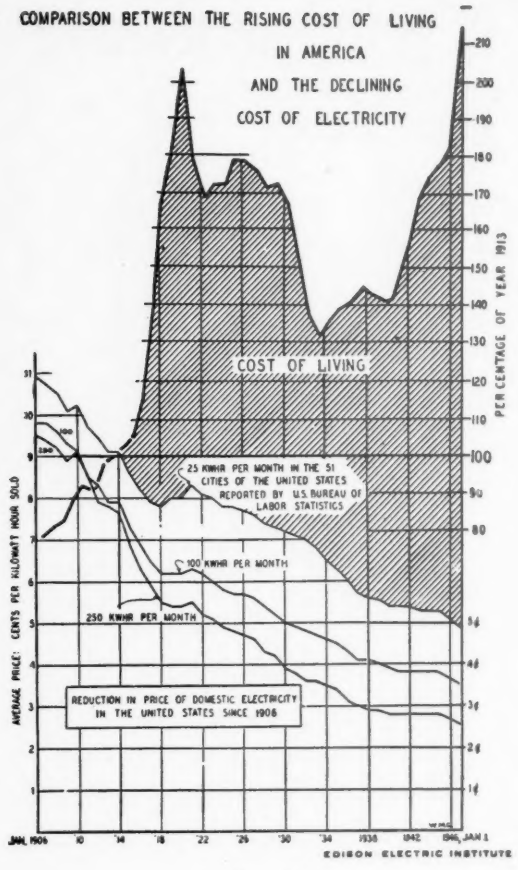

COMPARISON BETWEEN THE RISING COST OF LIVING
IN AMERICA
AND THE DECLINING
COST OF ELECTRICITY
COST OF LIVING
25 KWHR PER MONTH IN THE 51 CITIES OF THE UNITED STATES REPORTED BY U.S. BUREAU OF LABOR STATISTICS
100 KWHR PER MONTH
250 KWHR PER MONTH
REDUCTION IN PRICE OF DOMESTIC ELECTRICITY IN THE UNITED STATES SINCE 1906
AVERAGE PRICE: CENTS PER KILOWATT HOUR SOLD
PER CENTAGE OF YEAR 1913
EDISON ELECTRIC INSTITUTE

Fig. 1

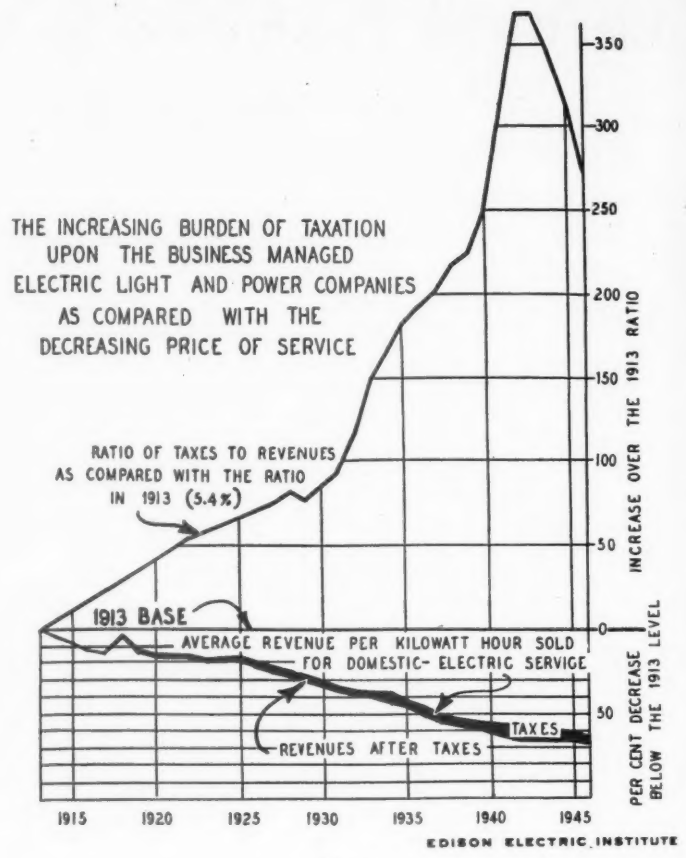

THE INCREASING BURDEN OF TAXATION
UPON THE BUSINESS MANAGED
ELECTRIC LIGHT AND POWER COMPANIES
AS COMPARED WITH THE
DECREASING PRICE OF SERVICE
RATIO OF TAXES TO REVENUES
AS COMPARED WITH THE RATIO
IN 1913 (5.4%)
1913 BASE
AVERAGE REVENUE PER KILOWATT HOUR SOLD
FOR DOMESTIC- ELECTRIC SERVICE
TAXES
REVENUES AFTER TAXES
INCREASE OVER THE 1913 RATIO
PER CENT DECREASE BELOW THE 1913 LEVEL
EDISON ELECTRIC INSTITUTE

Fig. 2

Viewed together these two Charts indicate that the business-managed electric companies are entitled to more credit for price reductions than appears from a consideration of the simple drop in the average price.

customers, in its war record of meeting all demands, military and civil, in its rate of growth of both customers and production, and in its prospects for the future.

Several factors have contributed to the rising demand for electric power. One of the most important is the continuing electrification of industry, a trend accelerated by the war. Starting out with an index number of 100 in 1939, both for manhours in manufacturing and for industrial use of electric power, exclusive of aluminum and magnesium production, by December, 1946, industrial consumption of electricity stood at 180 while manhours in manufacturing stood at 165.

Industry Requires More Electricity

The electrification of industry is now in full swing and as a result the demand for industrial electric power can be expected to increase steadily and rapidly during the next several years.

A second contributing factor is that electricity, compared to the cost of living and particularly compared to the cost of labor, is relatively much cheaper than before the war. Fig. 1 shows the price trend of the average kilowatthour sold for residential service, on the basis of 1913, against the cost-of-living curve, while Fig. 2 compares the price trend to the trend of taxes in terms of gross receipts. Viewed together, they indicate that the electric utility companies are entitled to more credit for price reductions than would appear from a consideration of the simple drop in the average price.

Another important factor contributing to the increasing demand for electricity is the addition of new customers to the books of the electric companies. During 1946, 2,109,218 were added, bringing the year's end total to 36,140,291, and as before noted the present total is 37,500,000.

This increase has been accomplished in spite of the housing shortage and the difficulties encountered in procuring poles, wire and electrical equipment. The gain in 1946 of 1,800,000 in homes and farms constituted the largest number of new connections in any year in the history of the electric power industry.

Most of the new customers have been added in rural areas. Only one-quarter have originated within urban limits. During 1947 about 520,000 more farms will come on the lines of power companies, REA cooperatives and local government power systems, bringing the total electrified farms, as defined by the U. S. Bureau of the Census, to about 3,850,000. This will constitute about 69 per cent of all occupied farms. Another 14 per cent have electricity available to them but have not yet taken the service.

A report of the Census Bureau as of November, 1945, revealed that 88.7 per cent of all occupied U. S. dwellings had electricity. Taking into account new customers added since then, the Edison Electric Institute estimates that at present 92 per cent of occupied dwellings have electricity and another 3 per cent have service available.

Assuming 41,000,000 occupied dwellings at the end of 1949, it is estimated that 94 per cent will be electrified and an additional 3 per cent will have elec-

tric service available. Fig. 3 shows this situation graphically.

As is apparent on the chart, the gap between total dwellings and electrified dwellings is rapidly shrinking. It has been suggested that the number of non-electric dwellings is approaching an irreducible minimum, and that as a consequence domestic electric sales are reaching a saturation point.

Most of the industry's officials disagree with this thesis. They point out that the constant development of new and improved electric appliances, and the increasing dependence of Amercian householders on electric power eliminate the possibility of such a saturation point, at least in the foreseeable future.

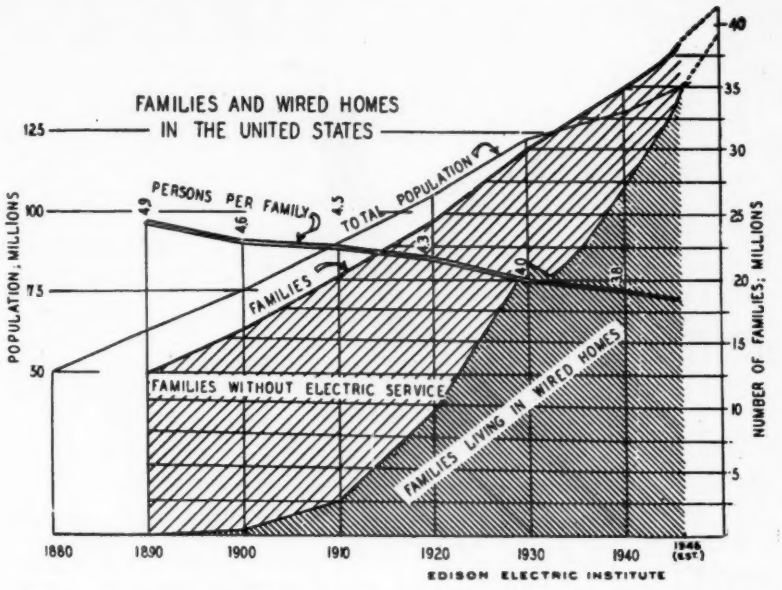


Fig. 3—Assuming 41 Million Occupied Dwellings in the U. S. at the End of 1949, It Is Estimated That 94 Per Cent Will Be Electrified, and An Additional 3 Per Cent Will Have Electric Service Available.

Generating Capacity and Peak Loads*

Production of electricity through the past 12 months was divided as follows: by the business-managed electric companies, 198 billion kwhr; by government power projects and municipal installations, 52 billion; by street railways, industrial and miscellaneous producers, 50 billion.

The presently installed generating facilities in the U. S. A. total 64,000,000 kw of capacity. The business-managed electric companies have 11,000,000 kw. Government projects and municipal plants account for 10,000,000 and industrial plants, street railways, and miscellaneous establishments, an additional 13,000,000.

In order to maintain a sound reserve of generating capacity to take care of emergencies, or unusual demands for power, and to provide in advance for predicted growth of power demand, the electric industry has continually endeavored to have installed and ready for use enough spare and reserve equipment to supply power demands 20 to 30 per cent in excess of calculated expectation of peak demands. In the case of compact and well interconnected power pools operating experience and engineering studies have established this percentage of spare and reserve capacity at 10 to 15 per cent, while small isolated systems, to insure reliability of service, have had reserves of 60 to 100 per cent. Power pooling has become much more prevalent so that in the future a national average figure for spare and reserve capacity is expected to for be perhaps 20 to 25 per cent during boom periods. In slack periods, of course, the spare and reserve capacity is a much larger percentage of the power demand.

During the war years the fabrication

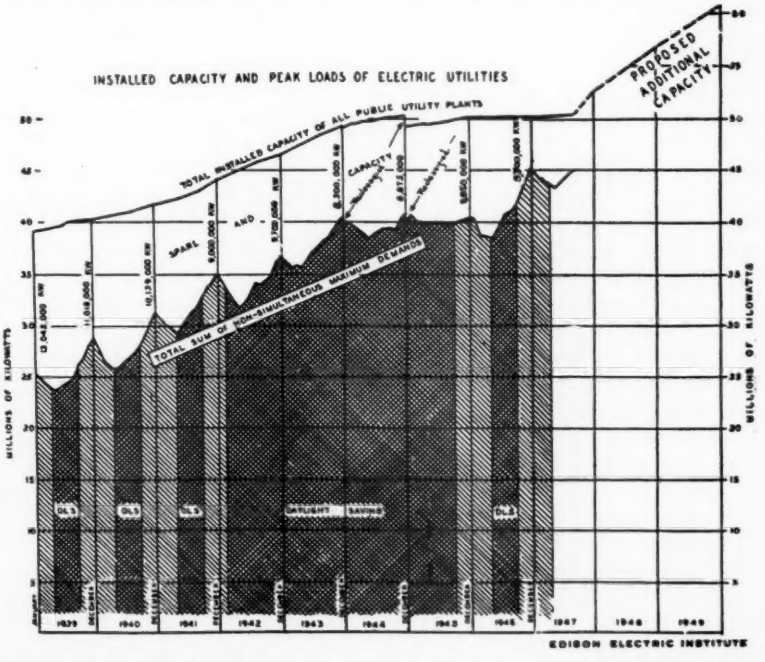


Fig. 4—Installed Capacity and Peak Loads Through the War and Immediate Postwar Period, and an Estimate of Generating Capacity To Bo Added During This and the Next Two Years.

* On the basis of continuous 24-hour-a-day operation one kilowatt of capacity, is capable of producing 8760 kwhr of electricity a year. Theoretically, the presently installed generating capacity of the electric industry alone, 50,500,000 kw of capacity, would produce 442 billion kwhr a year, if operated throughout the 24 hours of every day of the year.

For several reasons, continuous operation of all generating facilities is not practicable, the main one being the fact that customers use electricity in varying amounts over the 24 hours of a day. Some industries require electric service for only 8 hours a day, others 16, while very few in times of peace require it the full 24 hours. What is termed "peak load" occurs when maximum use by the greatest number of customers occurs at the same period of time.

The peak load of the year for the industry as a whole, usually occurs and runs only for a half-hour or so in the early evening of a single day in December, the period of longest nights. Comparisons between peak loads and generating capacity often overlook the fact that the peak is the highest single point of use of electricity in the 8760 hours of the year. During other hours the loads on the generators, that is the customers' use of electricity, are substantially less.

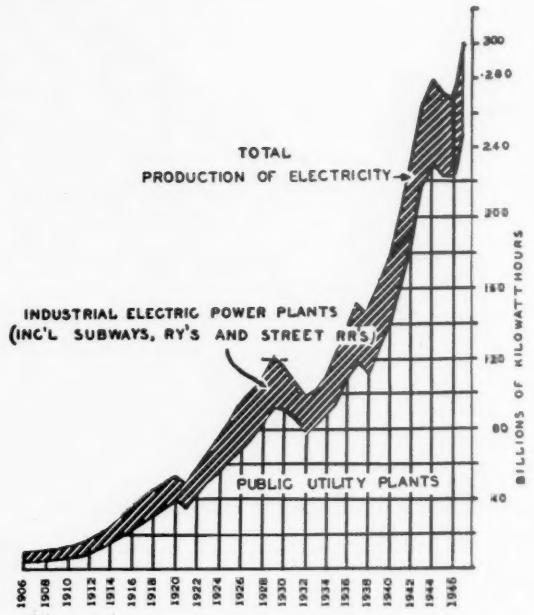


Fig. 5—Total Electricity Production For Each Year Since 1906.

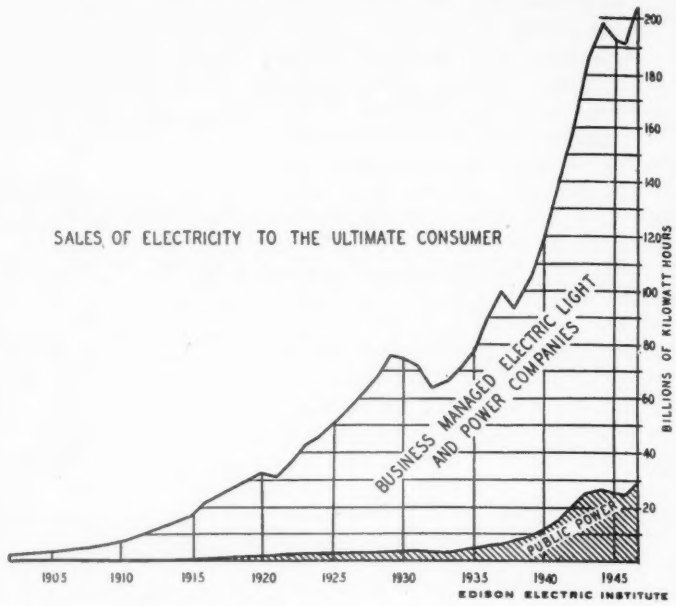


Fig. 6—Sales of Electricity to the Ultimate Consumer (Not Including Own Use by Producers, Transmission Line Losses, Nor Output of Industrial Plants, Street Railways, Etc.)

of generating equipment for public utility systems was interrupted to serve the more urgent demands on the productive capacity of the nation's electric equipment manufacturers for building turbines for warships, and the war demands for steel, particularly steel forgings and for copper. The War Production Board in 1942 suspended until just a few weeks before V-J Day orders of electric light and power companies amounting to over 2,000,000 kw. Some turbo-generators with design characteristics fitting closely the needs of a particular naval vessel or the requests of our wartime allies—even in one case installed and operating in a power station—were taken by the government for these purposes. Some companies that have needed spare capacity most in the past year are among those whose generating equipment was taken by the government. Under normal conditions manufacture and installation of a large electric generator may take 18 months to two years.

For these reasons, plus delays of several months by strikes in manufacturing plants, it was possible to install only 1,750,000 kw of new generating capacity in the period from Jan. 1, 1945, to midsummer, 1947. As a consequence of these conditions and the rapid growth of demand for power, the margin between peak loads and present generating capacity has been sharply narrowed. As now estimated, it will drop to about five per cent in 1947 against about 12 per cent in 1946, but there is no reason for any fear of a power shortage in the general meaning of that term.

Barring the simultaneous occurrence of several bad breakdowns perhaps curtailing a part of the power supply for an area for a few hours to a few days, the expert estimates are that the load will be carried and all new loads coming on will be served. This will be true in all except the case of a few smaller and isolated systems. In the larger interconnected areas, if the power demand edges up above the available generating capacity during the peak-load season, the worst that might develop would be the necessity for the power companies, in accordance with previous arrangement, to drop off for possibly 30 minutes on three or four days during the peak load season some of the pumping loads, such as water storage which can be interrupted a short time, and perhaps some of the other loads that could be cut off for a time without important loss to the customer. Also interruptible load paid for on an interruptible basis might be cut off for a time as contemplated in power contracts of the companies.

In some areas the period of narrowest margin of reserve has already been experienced. Some areas will still be faced with narrow margins of reserve in 1948 but the rate of installation of new capacity is expected to overtake the growth of load in all parts of the country within another 15 months.

Fig. 4 shows installed capacity and peak loads through the war period and includes an estimate of the generating capacity which will be added during this and the next two years. The peak loads shown are the sum of the non-coincidental peak loads on the several systems throughout the country. They give only a rough indication of the demands on the individual system or on the interconnected power systems.

Likewise, the installed capacity gives only a rough picture of the capabilities of the individual systems or interconnected systems to carry the load they have experienced or will experience. But for the broad picture, they form a convenient and fairly satisfactory basis.

In considering postwar peak loads, it is well to remember changes that have taken place in industrial management. During the war many industries operated "round-the-clock" with three shifts. Since the war the third shift, in most cases, has all but disappeared and the amount of work done on the second shift curtailed. This has added greatly to the demand upon the utility plants in that it concentrated into the daylight hours much of the industrial load that formerly was distributed over a 24-hour period.

Fig. 5 shows the history of the total production of electricity in the U. S.

(*Continued on page* 388)

New Generating Capacity Installations

To Be Added in the Business-Managed Electric Company's Five Billion Dollar Expansion Program

This is a preliminary and incomplete listing. Total orders listed here amount to about 12,500,000 kw of capacity. New capacity to be added in the five year period 1947-1951 inclusive will total 18,000,000 kw, of this sum 15,000,000 kw will be added by the business-managed electric companies. *Deliveries* of power generating equipment are now scheduled as follows: 1947, 3,257,000 kw; 1948, 5,215,000 kw; 1949, 4,915,000 kw; 1950, 3,383,000 kw; 1951 so far ordered, 1,000,000 kw. Steam power constitutes about 15½ million kilowatts; hydro power about 2½ million kilowatts.

Listed by Companies, expected year of installation and manufacturer's nameplate rating of generator capacity in kilowatts.

Company	July-Dec. 1947	1948	1949	1950
Alabama Power Co.	20,000	.....	120,000	.....
Almno System	.....	68,000	150,000	80,000
Appalachian Electric Power Co.	.....	.....	135,000	.....
Arkansas-Missouri Power Co.	.....	.....	30,000	.....
Bos'on Edison Co.	50,000	.....	85,000	.....
California-Oregon Power Co.	.....	25,000	.....	.....
Cambridge Electric Light Co.	.....	18,000	.....	.....
Carolina Power & Light Co.	.....	.....	.....	88,000
Central Arizona Light & Power Co.	.....	30,000	.....	.....
Central Illinois Electric & Gas Co.	.....	.....	20,000	.....
Central Illinois Light Co.	.....	.....	35,000	.....
Central Illinois Public Service Co.	50,000	.....	.....	.....
Central Kansas Power Co.	.....	.....	6,500	.....
Central Louisiana Electric Co.	.....	15,000	.....	.....
Central Maine Power Co.	20,000	16,800	.....	.....
Central Power & Light Co.	20,000	.....	50,000	.....
Cincinnati Gas & Electric Co.	.....	35,000	80,000	.....
Cleveland Electric Illg. Co.	.....	85,000	85,000	71,000
Columbus & Southern Ohio Elec. Co.	.....	60,000	.....	.....
Commonwealth Edison Co. & Subs.	107,000	.....	257,000	.....
Connecticut Light & Power Co.	.....	36,000	.....	63,000
Connecticut Power Co.	.....	5,000	.....	.....
Consolidated Edison Co. of N. Y.	50,000	170,000	50,000	120,000
Consolidated Gas Elec. Lt. & Pr. Co.	.....	60,000	.....	61,000
Consumers Power Co.	.....	170,000	180,000	60,000
Dallas Power & Light Co.	.....	.....	63,000	63,000
Dayton Power & Light Co.	.....	50,000	50,000	.....
Detroit Edison Co.	.....	.....	100,000	200,000
Duke Power Co.	.....	130,000	.....	130,000
Duquesne Light Co.	.....	.....	81,000	.....
Eastern Shore Public Service Co.	15,000	.....	15,000	.....
El Paso Electric Co.	.....	.....	20,000	.....
Empire District Electric Co.	.....	.....	.....	30,000
Fitchburg Gas & Elec. Lt. Co.	.....	.....	.....	10,000
Florida Power Corp.	.....	30,000	.....	30,000
Florida Power & Light Co.	.....	58,750	37,500	40,000
Georgia Power Co.	.....	122,500	22,500	80,000
Gulf Power Co.	.....	.....	22,500	.....
Gulf States Utilities Co.	38,000	.....	42,000	75,000
Hartford Electric Light Co.	.....	15,000	45,000	.....
Holyoke Water Power Co.	.....	15,000	.....	.....
Houston Lighting & Power Co.	37,500	10,000	120,000	60,000
Idaho Power Co.	16,500	40,700	30,000	.....
Illinois Power Co.	.....	.....	80,000	.....
Indiana-Michigan Electric Co.	.....	.....	135,000	.....
Indianapolis Power & Light Co.	.....	.....	40,000	40,000
Interstate Power Co.	.....	15,000	.....	.....
Iowa Electric Light & Power Co.	5,000	.....	.....	.....
Iowa-Illinois Gas & Electric Co.	.....	5,000	40,000	.....
Iowa Power & Light Co.	.....	.....	.....	40,000
Iowa Public Service Co.	3,408	4,544	15,000	.....
Jersey Central Power & Light Co.	.....	.....	36,000	.....
Kansas City Power & Light Co.	35,000	.....	.....	.....
Kansas Gas & Electric Co.	.....	29,000	.....	31,000
Kansas Power & Light Co.	.....	30,000	.....	40,000
Kentucky Utilities Co.	30,000	30,000	33,000	33,000
Lake Superior District Power Co.	.....	15,000	.....	.....
Long Island Lighting Co.	.....	40,000	40,000	.....
Louisville Gas & Electric Co.	60,000	.....	60,000	.....
Luzerne County Gas & Electric Co.	23,000	.....	.....	.....
Madison Gas & Electric Co.	.....	20,000	.....	.....
Metropolitan Edison Co.	48,000	.....	.....	66,000
Minnesota Power & Light Co.	.....	.....	45,000	.....
Mississippi Power Co.	.....	.....	22,500	.....
Missouri Utilities Co.	.....	.....	8,000	.....
Monongahela Power Co.	.....	.....	50,000	.....
Montana-Dakota Utilities Co.	6,000	9,000	.....	.....
Montana Power Co.	.....	.....	60,000	.....
Montaup Electric Co.	35,000	.....	.....	.....
Mount Carmel Public Util. Co.	4,000	.....	.....	.....
Nantahala Power & Light Co.	2,000	.....	.....	.....
New Bedford Gas & Edison Light Co.	20,000	.....	.....	.....
New England Electric System	45,000	.....	75,000	.....
New Jersey Power & Light Co.	.....	.....	66,000	.....
New York State Electric & Gas Co.	.....	30,000	.....	70,000
Niagara-Hudson Power Corp.	.....	180,000	67,500	195,000
Northern Indiana Public Service Co.	.....	.....	.....	66,000
Northern States Power Co.	42,500	37,500	65,000	30,000
Northwestern Public Service Co.	2,272	7,500	.....	.....
Ohio Edison Co.	48,000	52,000	60,000	60,000
Ohio Power Co.	.....	100,000	.....	135,000
Ohio Public Service Co.	65,000	65,000	.....	.....
Oklahoma Gas & Electric Co.	.....	25,000	50,000	.....
Otter Tail Power Co.	9,900	19,500	.....	.....
Pacific Gas & Electric Co.	.....	356,000	68,000	220,000
Pennsylvania Electric Co.	.....	30,000	30,000	40,000
Pennsylvania Power Co.	35,000	.....	.....	.....
Pennsylvania Power & Light Co.	.....	150,000	.....	.....
Peoples Gas & Electric Co.	.....	.....	7,500	.....
Philadelphia Electric Co.	.....	235,000	66,000	165,000
Potomac Edison Co.	35,000	.....	35,000	.....
Potomac Electric Power Co.	50,000	.....	80,000	80,000
Public Electric Light Co.	5,000	.....	.....	.....
Public Service Co. of Colorado	.....	40,000	.....	40,000
Public Service Co. of Indiana	.....	47,000	.....	50,000
Public Service Co. of New Hampshire	30,000	15,000	33,000	7,000
Public Service Co. of New Mexico	6,000	11,500	.....	.....
Public Service Co. of Oklahoma	30,000	15,000	.....	30,000
Public Service Elec. & Gas Co. of N. J.	100,000	200,000	100,000	.....
Rochester Gas & Electric Co.	.....	80,000	.....	.....
Rockland Light & Power Co.	.....	.....	20,000	.....
San Diego Gas & Electric Co.	50,000	.....	.....	50,000
Savannah Electric & Power Co.	.....	.....	20,000	.....
Scranton Electric Co.	.....	32,000	.....	.....
Sioux City Gas & Electric Co.	.....	10,000	.....	.....
South Carolina Power Co.	22,500	.....	.....	22,500
Southern California Edison Co.	22,000	155,000	120,000	.....
Southern Colorado Power Co.	.....	15,000	.....	.....
Southern Indiana Gas & Electric Co.	.....	.....	22,000	.....
Southern Wyoming Utilities Co.	7,500	.....	.....	.....
Southwestern Gas & Electric Co.	25,000	.....	25,000	30,000
Southwestern Public Service Co.	.....	53,000	43,000	.....
Staten Island Edison Co.	25,000	.....	.....	.....
Tampa Electric Co.	.....	30,000	.....	60,000
Texas Electric Service Co.	.....	70,000	.....	.....
Toledo Edison Co.	.....	.....	100,000	.....
Union Electric Co. of Mo. & Subs.	.....	80,000	.....	80,000
United Illuminating Co.	.....	30,000	.....	30,000
Utah Power & Light Co.	.....	.....	.....	44,000
Virginia Electric & Power Co.	.....	130,000	.....	140,000
Western Massachusetts Electric Co.	.....	.....	45,000	.....
West Penn Power Co.	.....	80,000	.....	80,000
West Texas Utilities Co.	.....	7,500	.....	.....
Wisconsin Electric Power Co.	.....	80,000	80,000	.....
Wisconsin Michigan Power Co.	.....	.....	17,800	.....
Wisconsin Public Service Co.	30,000	.....	50,000	.....
Yearly TOTAL	1,381,080	3,931,794	3,942,300	3,235,500
Grand Total July 1947–1950	12,490,674	.....	.....	.....

Revision of Code for Electricity Meters

By A. J. Allen

Chairman, Electric Light and Power Group of ASA Sectional Committee C12

THE Code for Electricity Meters has suggested, in its various editions, schedules for the periodic testing of meters, revising the suggested periods between tests from time to time in line with field experience. The improvements in overall meter performance through the years, on which the lengthening of the various schedules has been based, were brought about by improvements in meter design, resulting in the gradual elimination of the use of early designs, and also by improved design replacement parts for installation in other types of meters left in service. An example is the use of non-corrosive bearing materials, which have produced bearings apparently good for the life of the meter. These changes, together with a general improvement in meter maintenance methods, have brought about a record of meter performance which more than justifies the extensions in schedules made to date.

In the period 1910 to date the small capacity d-c meter has had its schedule extended from 12 months to 42 months and the schedule for the small capacity a-c meter has been extended from 24 to 72 months, with a temporary "war" change, effective since November 5, 1942, to 96 months. Except for an increase from 6 to 12 months for meters over 100 kw, no change has been made in the d-c schedule since the 1928 issue of the Code. There have been no developments in d-c metering since 1928 and there is a steady decreasing use of d-c meters. The situation is quite different with respect to a-c meters, however. A survey of a number of utilities made after the war indicates that tests on a 96-month schedule have produced a record of meter performance which shows very small deviation from meter performance on a 72-month schedule.

The survey data contributed by electric light and power companies in various sections of the country is summarized herein. The data were gathered from 21 utilities, 13 of which have test results on both 72-month and 96-month bases. The tests made on the longer schedule, about 200,000 meters, although representing only about one-sixth of 1,200,000 tests made on a 6-year schedule, are sufficient in quantity to enable conclusions to be drawn.

RECORD OF METER PERFORMANCE

Compared on Basis of ±2% Deviation from 100% Accuracy

			Accuracies "As Found" on Test					
			Full Load			*Light Load*		
No. of Utilities	*Test Schedule*	*No. of Tests*	*Below 98 Percent*	*Between 98 & 102 Percent*	*Over 102 Percent*	*Below 98 Percent*	*Between 98 & 102 Percent*	*Over 102 Percent*
21	72 months	1,228,587	1.2	97.3	1.5	8.0	89.4	2.6
13	96 months	204,700	1.8	96.4	1.8	8.9	88.3	2.8

Compared on Basis of ±4% Deviation from 100% Accuracy

			Accuracies "As Found" on Test					
			Full Load			*Light Load*		
No. of Utilities	*Test Schedule*	*No. of Tests*	*Below 96 Percent*	*Between 96 & 104 Percent*	*Over 104 Percent*	*Below 96 Percent*	*Between 96 & 104 Percent*	*Over 104 Percent*
19*	72 months	1,067,624	0.2	99.6	0.2	2.0	97.6	0.4
12*	96 months	183,909	0.3	99.3	0.4	2.1	97.4	0.5

* Two utilities furnished no data on ± 4 per cent basis.

The so-called "war schedule" for small a-c meters not only extended the test period from 72 to 96 months but also broadened the range from 0-6 kva to 0-12 kva. A large number of meters within the 6.1-12.0 kva range of sizes are of the multi-element class. The tabulated results shown above reflect the performance of a cross-section of multi-element meters made on the extended 96-month schedule, since the "small meter" category of 0-6 kva includes two-element meters up to 25-amp capacity and three-element meters up to 15-amp capacity.

The test results on a 96-month basis, as reported above, indicate no trend towards lowering the excellent performance of our American-made meters. The fact is that the test results for meters properly maintained in accordance with the Code serve as an indication that no limit of test periods has yet been reached.

The American Standards Association Sectional Committee dealing with the Code for Electricity Meters has reviewed the war time experience with the extended test period and has approved a revision of Paragraph 827. This revision, given below, has been adopted by the American Standards Association.

"827. Schedule. The sustained accuracy of meters between tests depends on many factors, primarily those of maintenance in service. A suggested schedule is presented below for periodic tests of meters maintained in accordance with the provisions of this Code:

SCHEDULE FOR PERIODIC TESTING OF WATTHOUR METERS

Alternating-Current Meters	
Up to and including 12 kva	at least once in 96 months
Over 12 kva up to and including 100 kva	at least once in 24 months
Over 100 kva	at least once in 12 months
Direct-Current Meters	
Up to and including 6 kw	at least once in 42 months
Over 6 kw up to and including 100 kw	at least once in 18 months
Over 100 kw	at least once in 12 months

"NOTE: The kva rating of an a-c, single-element meter or the kw rating of a d-c meter is the product of the rated voltage and the rated current. In the case of a polyphase or a multi-element meter the rating is the sum of such products for each element. The rating of a 2-element meter when of the split-coil type or when associated with 3 current transformers and used to measure energy in a 3-phase, 4-wire Y-circuit is 3 times the rating of one element. When a meter is connected to instrument transformers or shunts, the nominal rating of the transformers or shunts shall be used in the determination of the kva rating of the meter."

Super High Voltage Transmission Research Begins at Tidd 500 – Kv Test Project

A THREE year test and research period in super high voltage transmission that will bring into being new concepts of power transmission and may affect considerably the mechanics and economics of high voltage transmission began with a brief ceremony on October 1 at the Tidd 500 kv Test Lines project at Brilliant, Ohio, when Philip Sporn, President of the American Gas and Electric Service Corporation operated controls that boosted an initial supply voltage of 69,000 volts up to 500,000.

Investigations at the test project on which plans were announced more than a year ago, will be centered about corona loss, insulation coordination and radio interference at voltages from 264 to 500 kilovolts. These investigations are expected to provide essential data for the design of transmission lines and terminal equipment for the economical transmission of power at these high voltages in the relatively near future.

Construction of transmission lines for voltages in excess of the present maximum operating value (287 kilovolts) is technically feasible at this time, based on experience with lower voltage designs. However, lower cost construction is expected to result from the data which will be obtained with the test installation, as the extended knowledge should permit more closely evaluating the margins now believed necessary in the selection of conductor diameter, spacing, insulation levels of line, and terminal apparatus.

New Uses, New Loads

In the course of his remarks at the opening ceremony Mr. Sporn observed that,

"With increased uses and new loads and with increased generation facilities, there come demands for new dimensions in transmission. More transmission is needed to transmit the much larger blocks of power from the generation to the load centers. Thus, systems operating over an extensive area will require vastly increased transmission facilities to provide the proper capacity in their integrating and co-ordinating networks. The ties between adjoining systems will have to be on a much bigger scale and all of that will require voltages higher than have been utilized heretofore, if the economics of transmission are to be maintained in balance.

"But before the necessary transmission lines can be designed with a degree of knowledge and precision to bring about economical transmission, more technical information is needed about the characteristics and performance of the phenomena and the materials involved in building lines above the present highest voltage at which lines are operated, 287,000 volts. In particular we need to know the performance and behavior of the air surrounding a high voltage conductor when the conductor is raised to such high voltages. We need to know the performance of the insulators which keep the electric pressure from breaking through and going to ground, instead of staying on the conductors. We need to know what kinds of conductors and what arrangements can best accomplish the transmission purpose at these higher voltages; and when we know that, we can design our supporting structures with a degree of accuracy that economy dictates. And finally, we need to have a great deal more information than we have on the performance of a good deal of other equipment that enters into the operation of a high voltage system—the circuit breakers, which are the devices which switch the power on and off; and the lightning arresters, which keep lightning from breaking through and entering the equipment and destroying it; and the transformers, themselves, which both raise the pressure of the electric power to the high transmitting voltage, and lower it again to bring it to values that can be handled along highways, on farms and in homes."

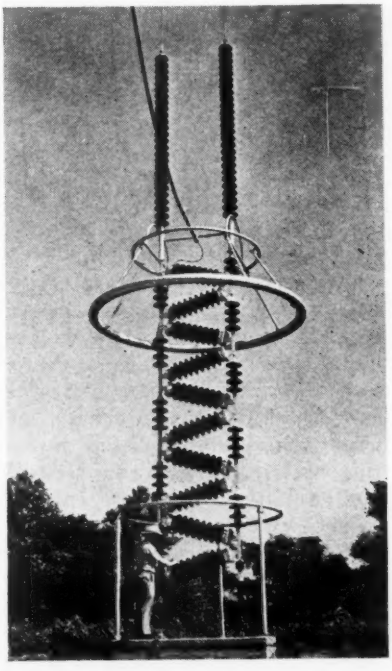


Fig. 1—At the Tidd Project—Westinghouse 500-Kv Earthquake-Proof Lightning Arrester for Highest Voltage Line Ever Built.

Contributing Manufacturers

The project was conceived and initiated by the American Gas and Electric Service Corporation, which invited a number of manufacturers to cooperate with them in the research and test program. The Westinghouse Electric Corporation contributed the power transformers, lightning arresters, and the measuring equipment, and has also been active in planning the investigation. The American Bridge Company contributed the towers, and the Ohio Brass Company and Locke Insulator Corporation, insulators and hardware. The Aluminum Company of America, General Cable Corporation, and Anaconda Wire & Cable Company supplied the conductors, and the General Electric Company is supplying an oil circuit breaker and arrester. Also participating in the project are The Ohio Power Company, Appalachian Electric Power Company, Indiana & Michigan Electric Company, Wheeling Electric Company, Kentucky and West Virginia Power Company, Incorporated, and Kingsport Utilities, Incorporated, all subsidiaries of the American Gas and Electric Company.

Of primary importance in considering transmission at voltages in excess of 230,000 volts are power transmision ability, reliability, and economics. Trans-

Through Private Enterprise—

Concluding Remarks of Mr. Phillip Sporn, President of the American Gas & Electric Co., at the Initiation of the Tidd Project, October 1, 1947:

"I THINK it might be pertinent to call attention to the fact that this entire project is an outstanding example of cooperation between a group of segments of private enterprise. There does not seem to be any question that both technologically and economically the development of electric power, and the art of electric power generation, transmission and distribution has gone farther in the United States than anywhere else on the face of the civilized globe, and it has done so largely under a system of private enterprise. Both, the power systems themselves, and the manufacturing groups that build and supply the equipment, belong in that category.

"We hear a great deal these days about the private enterprise system having to prove itself in order to meet the challenge of collectivism. The recent war gave a demonstration on a universal scale that people operating under a democracy could out-think, out-plan, out-build, out-produce and out-fight those operating under a totalitarian impediment. On a much smaller scale, we see here today that in a particular field of technology the private enterprise system can likewise out-do those operating on a collective basis."

mission ability, or power limit, is increased roughly as the square of the voltage—hence, the urge to higher voltages. Power limit also varies inversely as the impedance. A small spacing between conductors is thus desirable to reduce impedance and increase transmission ability. Economy is also promoted when the spacing between conductors is as low as possible so that towers can be made lighter and smaller.

One of the most important factors affecting reliability is the degree of protection against lightning outages. Beyond a certain number of insulators, which in turn fixes the air gap clearances to the tower and the spacing between conductors, a line becomes essentially lightning proof. Thus beyond a particular line voltage, lightning protection is independent of the transmission voltage utilized. This limitation for the types of construction normally employed in this country is reached at about 16 to 18 insulator units with flat configuration of the conductors, and with tower footing resistance below 20 ohms.

Power transmision ability is increased, and costs are reduced by utilizing a small conductor spacing. On the other hand corona losses are higher with closer spacing of conductors. Thus, corona is important because the power loss associated with it may constitute an important economic factor and because excessive corona may interfere with radio reception in the vicinity of the line.

High Voltage Corona To Be Studied

A definite lack of information exists regarding certain phases of the corona problem. Transmission at extra high voltages will probably involve larger conductor sizes and different arrangements, upon which very limited data are now available. Previous corona tests were limited in the conductor spacings that were used, and were made mostly without ground wires in position. Little or no data are available on the effect of towers, particularly with regard to radio influence. Previous investigators have concentrated on such phases of the problem as the surface conditions of the conductor—the effect of die grease, pulling burrs, weathering, etc.—and upon atmospheric conditions—temperature, barometric pressure, and humidity. However, rain, hail, sleet, and snow and even cloudy weather exert a profound influence upon corona effects and on these features further data are essential.

Thus it is clear that existing data are too indefinite to project higher voltage transmission lines with engineering certainty, without further study and research into the corona and associated problems. For this reason the test project described here was initiated.

Full Scale Equipment To Be Used

A flat relatively level area was chosen for the test project along the banks of the Ohio River just outside of the Tidd Power Plant at Brilliant, Ohio, 48 miles by road from Pittsburgh. Three test lines such as would be used on an actual system are provided; two of them are 1½ miles long and the third is one span in length. The latter will be used primarily for preliminary tests on different diameter conductors and on combinations of "grouped" conductors, and for tests on leakage of insulator strings.

Transformers

A bank of three single-phase transformers converts the energy from the 66-kv 3-phase supply to a high-tension voltage, line to line, ranging from 264,500 volts to 500,000 volts. The transformers have a bank rating of 5000 kva. Some idea of their size can be obtained from the fact that the distance from the bottom of the tank to the top of the bushing measures 33 ft. The transformers are connected delta on the primary side and solidly grounded wye on the secondary or high-voltage side.

Busses

Busses are provided for connection of the three transmission lines to the transformers. A special bus structure was constructed which covers an area approximately 340 ft by 20 ft. The distance of the upper conductors from the ground is 54 ft. Ground wires extend over the transmission line and station and completely shield the bus structure. The bus itself is of two-in. segmental copper conductor to minimize corona on the bus even at high voltage, and to provide means for shielding the measuring leads which are carried inside the bus conductor. In this manner any loss associated with the bus structure is excluded from the measuring circuit. The bus is supported by 26 insulators per string.

Towers

Each 1½ mile line consists of seven towers, of which two are dead-end towers. The ground wires are 124 ft above ground at the towers and the height can be carried within limits. Provision has been made to vary the lateral spacing of the conductors between 32 and 45 ft. The height of the conductors at the towers is about 85 ft and they are sagged 45 ft. Average span length is approximately 1100 ft.

Insulators and Hardware

The lines are strung with 30 conven-

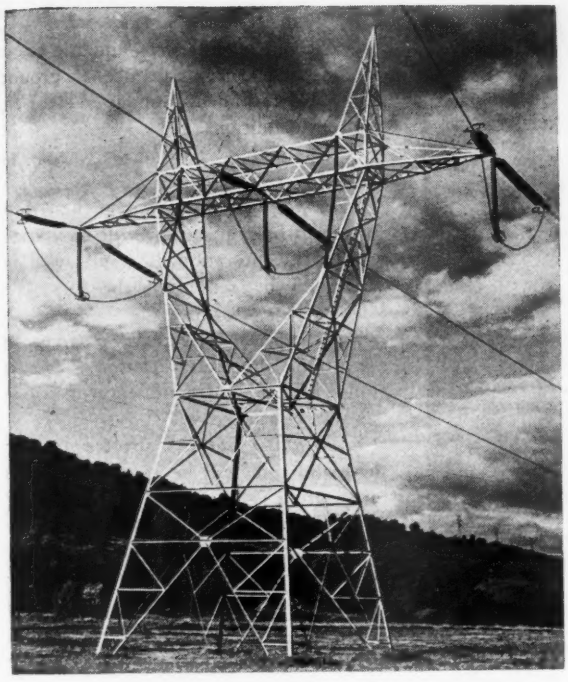


Fig. 2—Dead-End Tower of the 500-Kv Line, Single Circuit, Flat Configuration, to Operate Without Ground Wires, Using 30 Insulators per Suspension String.

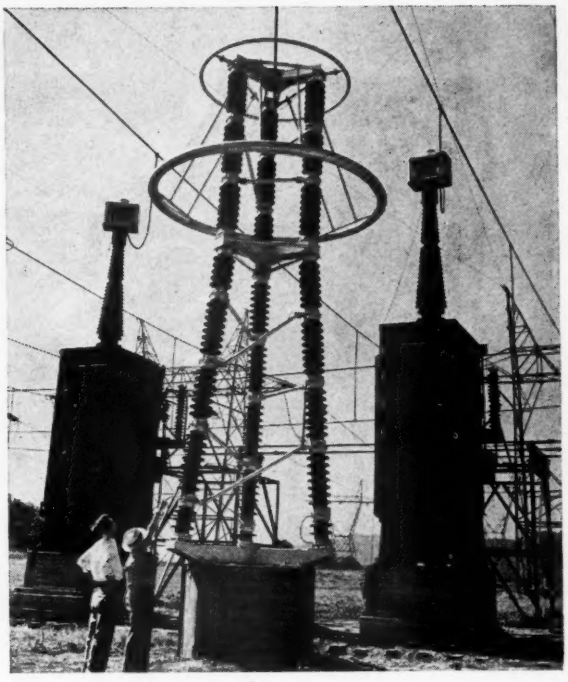


Fig. 3—World's Largest Self-Supporting Lightning Arrester, Built Especially to Operate Under the High Voltage Conditions of the Tidd Project.

tional 5¾ in. spaced insulators per suspension string. Provision will be made for determining the effect of shorter strings. Different types of grading rings are provided by the insulator manufacturers and in all cases are connected to the line end of the string only. Special hardware for each particular type of conductor is provided.

Line Conductors

The line conductors now installed are 1.65 in. O.D. stranded copper with tors on one line; 2.0 in. O.D. ACSR with paper filler on the second line; and 1.65 in. O.D. stranded copper with I-beam core on the short line. It is planned to use a smaller single conductor segmental copper, and the "bundle" or grouped conductor later in the tests on the short line.

Lightning Arresters

Two types of lightning arresters are provided to protect the transformers and to obtain service experience at these high voltages. Since the line will operate at 500 kv at times, arresters with a maximum rating of 350 kv have been provided. This represents a 70 per cent arrester which is justified because the system is well grounded. Electrically, the arresters are made up of standard units which will withstand the conventional impulse tests. For operation of the line at sustained voltages for a long period of time, provision is made to short circuit certain sections of the arrester so that operating experience can be obtained on a proportional part of the arrester.

Mechanically, the construction departs quite radically from past tradition. Two types of units have been provided, one is self-supporting in the form of three columns of elements in which each column consists of alternate sections of insulators and arrester units. The other type of arrester is suspended from the bus structure so as to provide an earthquake-proof construction, thus enabling experience to be obtained on an arrester that might be required in earthquake areas. Grading rings are placed to distribute the potential uniformly between the individual units comprising the complete arrester. The height of the self-supporting arrester is 29 ft and of the suspended type 23 ft. These are the largest arresters that have ever been built.

Measuring Equipment To Be Read With Telescope

The instruments for measuring corona loss are mounted in an aluminum box located on top of the transformer high voltage bushings. Potential for the instruments will be provided by an extension of the main winding of the transformer at the high voltage end. This extension not only supplies power to the volt-meter and potential coils of the instruments, but also power for auxiliary equipment such as lights, rectifiers, controls, etc. The corona loss is measured directly by wattmeters with current coils in series with the line. Power is measured by indicating instruments observed through a high-power telescope from an observation booth located approximately 60 feet away, or can be recorded over long periods of time by means of graphic meters. Special high speed recording meters are provided which can be controlled remotely as desired. The slowly moving meters permit integrating effects over long periods of time and the high speed meters permit study and coordination of loss under abnormal weather conditions. Remote control of the measuring equipment is provided by supervisory control relays operated from the observation booth. Locating the meter-equipment on top of the transformer bushings has the advantage of eliminating the losses in the transformer itself. Various other measuring instruments to record atmospheric conditions will be

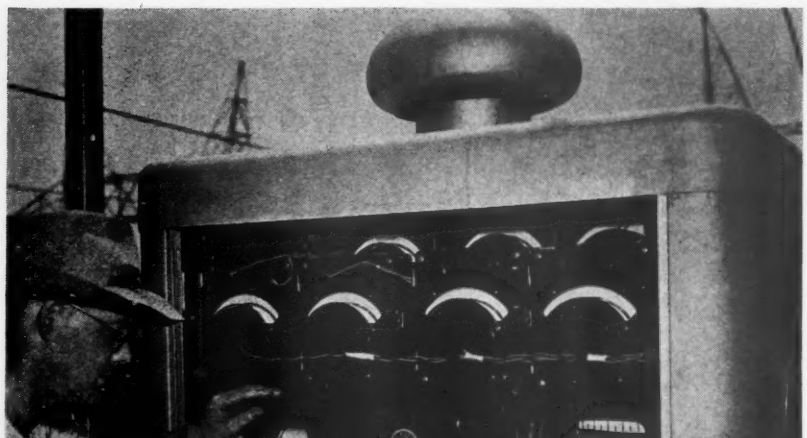


Fig. 4—Corona Measuring Equipment Mounted 35 Ft. Above the Ground on a Transformer Bushing. Readings are Taken by Telescope From an Observation Booth 60 Ft. Away.

provided, such as a graphic thermometer, barometer, hygrometer, precipitation meter, and an instrument for measuring of ground gradients which may influence corona.

An important phase of these tests is the determination of radio influence. Modern instruments for measuring these effects will be provided. A portable instrument that will permit measurements along the line and at various points laterally from it will be used. Radio frequency traps have been installed in each line to confine disturbances that might originate within the substation area and prevent their being propagated into the line on which measurements are being made. A second instrument will be used to record radio noise over long periods of time at particular points along the line.

Mechanical and Electrical Factors To Be Tested

The features toward which attention will be directed initially in this field research on corona and other phenomena are:

1. *Conductor sizes* ranging in diameter up to 2 in. in both the segmental and wire form will be tested. Grouped conductors consisting of 2, 3, and 4 wires, smaller in diameter than if only one per phase were used, and spaced at distances in the order of one or two feet, will also be tested.

2. *The number of insulators* will be varied up to a maximum of 30.

3. *Lateral spacing* of conductors in flat configuration will be changed.

4. *The height of ground wires* will be varied in several steps and the effect of the presence and absence of ground wires determined under identical weather conditions.

5. *Conductor weathering* will be studied.

6. *Atmospheric conditions* such as rain, fog, sleet, hail, and snow will be investigated. Interpretation of results will be facilitated by recording the loss over long periods of time.

7. *Atmospheric electrical gradients* at the ground and their variation with rain clouds and also their influence upon corona will be studied.

8. *Insulator loss* as affected by fog, sleet, and rain will be susceptible to determination.

9. The effects of all these factors on radio reception will be determined. In particular, the conditions at the tower will be given careful attention.

Technical Description of This Field Research Project

A more complete description of this cooperative test research, including objectives, details of layout, apparatus, metering equipment, etc., will be covered by a group of seven technical papers to be presented before the American Institute of Electrical Engineers at its midwest meeting in Chicago, November 3 to 7, 1947.

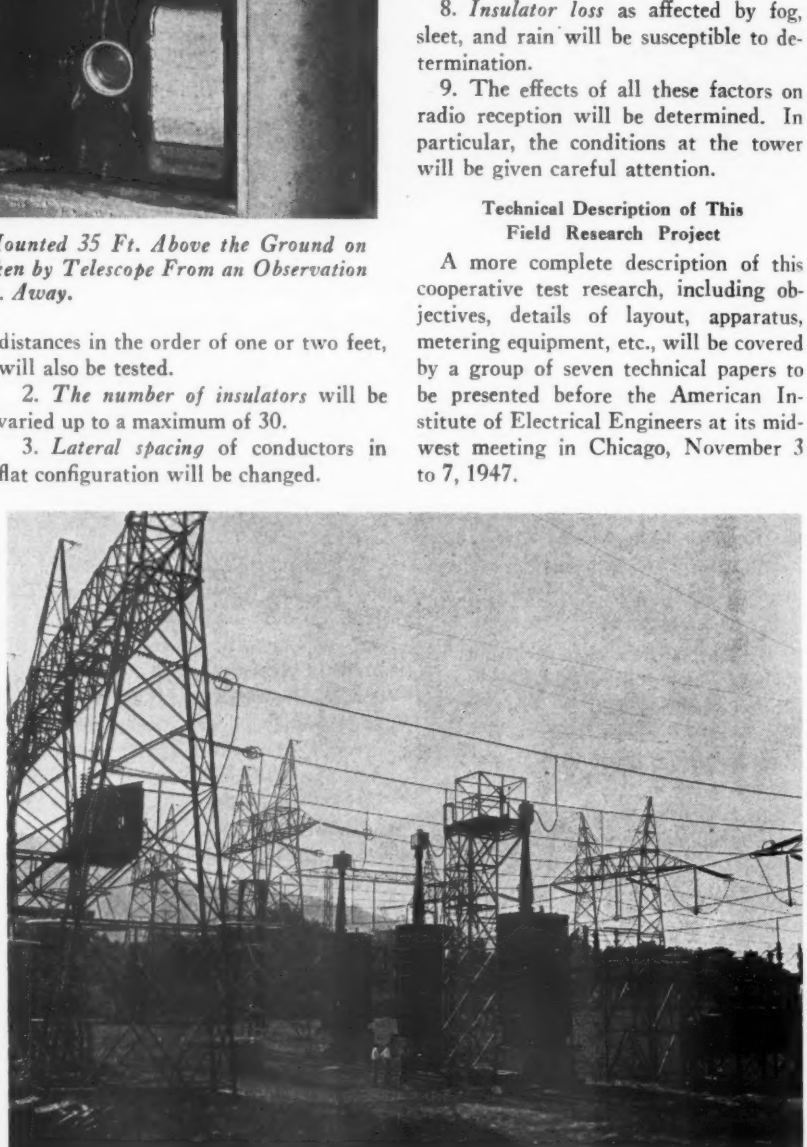


Fig. 5—Station End of Line Showing at Left the Observation Booth Where a Telescope Reads Corona Measuring Equipment Mounted on Transformers, Center. Low-Voltage Circuit Breaker Can Be Seen at Far Right.

How to Lose Friends—How to Make Them

A Time-proved Policy for Lush Dividends in Customer Relations

By Edward T. Kaveny
Secretary of the Public Service Commission of Wisconsin

An address presented at the Wisconsin Utilities Association, Accounting Section convention, Lake Delton, Wis., on September 25, 1947.

A HURRIED customer went into the business office of a utility to pay his bill. He was pressed for time; it was his lunch hour; his automobile, motor running, was parked outside the building in a restricted zone where he was momentarily in danger of receiving a parking ticket for violating a city ordinance. But this was the final discount day. If the bill were not paid today, the customer would lose the discount. He had searched through the "whatnot" at home and he had been unable to find his bill. He had made a further harassed hunt through the drawers of his office desk, but could not find the statement. As the bill was from a telephone utility and he had no long-distance calls, he knew that the amount was the same as it had been the previous month, so before he left the office, he wrote a check for the correct amount. He might have mailed the check, but since the business office of the telephone company was only a few blocks away from his own, he had decided to pay the bill personally and protect his discount.

The subscriber approached one of the cashiers and handed her his personal check on which he had neatly written his telephone number to insure proper credit.

"You'll have to get a duplicate copy of your bill," the stern and beauteous cashier informed him. "Go over to Miss Carbon Copy and at such-and-such a desk and she will make one out for you."

The Distressed Customer

"I haven't time to wait for a duplicate copy," the distressed subscriber protested, remembering that the motor of his car was still running in a "No Parking" zone. The parking ticket would cost him a dollar; the discount was 27 cents with federal tax.

"You will have to have a duplicate," the girl informed sternly and unflinchingly. "I cannot accept the check without the bill."

"You mean to tell me that you won't accept my check unless I have a duplicate bill?" the now exasperated subscriber demanded.

"You'll have to have a duplicate of your bill," the girl insisted, shaking her head solemnly.

"But I could have mailed the check without a copy of the bill," the subscriber insisted.

"You must have a duplicate copy of your bill," she said with determination and sweet finality, "before I can accept the money."

The subscriber stormed out indignantly, still holding his check.

How to Lose Friends

Returning to his office after lunch, defeated in his attempt to pay his telephone bill on the last discount day, the customer smoldered with resentment against the methods of the phone company. The more he thought about it, the more his indignation increased. Finally, he called the local manager and demanded to know why the company refused to accept payment without a duplicate copy of the phone bill.

"We never turn down money," the manager explained glibly and pleasantly. His voice was almost confidential. "The girl was misinformed. She's new on the job. I'll send someone over after your check if you wish."

The customer, now mollified, replied that it was unnecessary; he knew mistakes could be made in any office, and he would be glad to drop over to the business office again before closing hour and leave his check. He did arrive a short time before closing. This time he encountered another lovely and efficient cashier.

"You will have to have a duplicate copy of your bill," she said with a sweet smile. "Just step over to Miss Carbon Copy."

The subscriber was now in a rage. "I'm not going to see Miss Carbon Copy," he insisted. "Doesn't anybody here accept money?"

"But you will have to have a duplicate copy of the bill," the girl insisted, even more pleasantly.

"Here's my check," the subscriber exploded. "You'll take it and credit it to my account, duplicate bill or no duplicate bill."

"But we'll have to have a duplicate copy of the bill," the girl insisted, with a sugary smile.

"Listen," the subscriber exploded. "This is the second time I've been back here today trying to pay this bill. I phoned the manager and he said I didn't need a duplicate to pay my bill."

"But we have orders not to accept payments without the bill," the girl said determinedly and unperturbedly.

"You'll take this check and credit it to my account and like it," the subscriber snapped, pushing the check toward the girl, turning on his heel and walking indignantly out of the office.

The girl picked up the check, examined it curiously, shrugged, and then performed whatever legerdemain was necessary to credit it to the subscriber's account.

This incident is a splendid example of poor public relations.

Here is one more illustration of duplicate bills and unfavorable public relations. Another utility, a gas and electric one, has its cashiers' office conveniently located on the main floor. If the unhappy customer has forgotten or lost his bill, he is politely but firmly directed to climb a winding, tortuous staircase to the second floor to obtain his duplicate bill. If it is the noon hour, he may have to wait his turn in line while the girl makes out duplicates for other restless customers. He then returns downstairs, the round trip consuming at least five or ten minutes. Then, finally after he has thoroughly documented himself as being eligible to pay the bill, his money is accepted.

Time-Consuming and Aggravating

Now, this twisting staircase may be perfectly grand exercise for the youngsters, or even the healthy oldsters who wish to slim their abdomen or tenderize their calves, but it is rather strenuous medicine for persons with heart eccentricities, physical defects, or who are in their declining years.

That a customer who tries to pay his bill be required to climb stairs to get a duplicate, is time-consuming and aggra-

vating. It does not improve customer relationship. Yet, this particular utility has an exceptionally fine record of customer relationships, and is courteous, prompt, and tactful in its services to customers. However, this one irritation repeated daily destroys considerable goodwill created by other departments.

Public Relations Pain-Killer

Contrast these incidents with the attitude of banks when a customer offers money for deposit, without having filled out his deposit slip. In most banks the teller, no matter how busy, will make out an original and a duplicate deposit slip and then hand to the customer a receipted duplicate to be credited later in his account-book. I do not mean to imply that banks generally have better public relations than utilities. But in handling duplicate bills, many utilities unnecessarily bruise the customers' feelings by poor public relations policies. They fumble an opportunity to send the customer away satisfied and happy. After all, the customer is trying to pay his money for services rendered, and the utilities should facilitate the painful process with the anesthetic of good public relations. This is later translated into friendly customer relationship.

Public relations is merely human relations. The same rules and precepts that apply to the relations between people work with equal force in the field of public relations.

Public Relations and Publicity

Public relations is an art which has attracted considerable attention in recent years from management. To some persons, the term public relations is synonymous with publicity. While public relations does encompass the publicity sphere, publicity is merely one of its ingredients, just as the yeast is part of the loaf of bread. Too much yeast spoils the bread; too little makes it flat. Too much publicity can ruin a business or an individual; too little publicity can defeat a sound program. Publicity is an ingredient which should be used judiciously. Every experienced public relations man knows that persistent, self-serving publicity efforts are dynamite that may, at any time, explode in the face of the publicity "hound," as he is known in the vernacular of those who struggle with "canned releases" intended for publication.

Tact is a priceless ingredient of public relations. Some persons have the gift of tact; others are so utterly devoid of tact they should not be permitted to come in contact with the public. They have a talent for rubbing people's fur in reverse and arousing hostility. They should be isolated behind closed doors with a "Do Not Enter" sign.

Business letters should be written only by those who have achieved a reasonable mastery of the art of letter-writing. This unquestionably is a gift. But it is an important component of good public relations.

Letters—Good and Bad

Certain persons have an unhappy genius for writing letters that offend. Their correspondence is often brusk, dictatorial, and even discourteous. They lack the facility of using the written word gracefully. Their letters are muscle-bound and clumsy. Often, when they attempt to placate, they merely offend. Persons with this unfortunate faculty should not be permitted to write business letters except in case of great urgency. Lest they be tempted to dictate letters, a secretary should be assigned to them who cannot take dictation.

Letter-writing reflects the inner personality of the writer. It can be a medium for creating good customer relationships or a device which irritates them. Tactful, friendly letters can be written even on unpleasant subjects. No letter should leave a sting unless a rebuke is the deliberate intention of the writer and letters in this category should be used as sparingly as red pepper on spaghetti. Often it is better to write such letters and then throw them briskly into the waste-basket.

The telephone is often the first point of contact between the customer and the utility. The voice that says, "Mediterranean Gas and Electric Company," is the voice of the company so far as the customer is concerned. If the tone is harsh, unpleasant, or discourteous, the customer is irritated. If the voice is pleasant and courteous, the customer is soothed, even if he is calling to make a complaint. The customer knows that the Mediterranean Gas and Electric Company must be a pleasant place to transact business. It has such a pleasant voice.

The telephone occupies a most important position in public relations. One of its most irritating misuses occurs when the voice of a secretary announces, "Mr. Big Shot is calling you." The recipient of the unsolicited telephone call is obliged to drop whatever he is doing and wait with the receiver to his ear while the secretary traces Mr. Big Shot around his building and finally locates him possibly in one of the subterranean cubicles adjusting his necktie, or far up in the penthouse retreat, wrestling with an aqua pura highball.

Each of you, I'm sure, can recall immediately several persons whose secretaries invariably require you to wait on the telephone until it's convenient for the person who telephoned you to pick up his receiver and talk. This is discourtesy of the rankest and most flagrant sort. Mr. Big Shot may be doing nothing more important than lolling through the financial pages while you may be in the midst of a conference. Possibly the time of the person called and waiting on the line is as valuable as that of Mr. Big Shot. How often one wishes it were possible to hang up the receiver and let Mr. Big Shot do a handspring into his ash-tray.

Conversely, there are persons occupying positions of tremendous responsibility who are never too busy to talk as soon as the connection is established. They do not require the party called to hang on to the telephone waiting.

Receptionist and Public Relations

Of great importance is the receptionist who greets the public. Here, first impressions are often permanent. The receptionist should be selected with consummate care. She should be easy to look at, but not so devastating that she takes the customer's mind off his work, or causes him to forget that he came in to pay a bill, or to see the president, or even the 33rd vice-president. Pleasant, neat, well-dressed, intelligent receptionists create more good-will for a business hourly than the president and the board of directors could generate if they were to walk up and down both sides of the street and shake hands with every passerby.

The pattern of public relations, good or bad, is inextricably interwoven through the personnel fabric of any organization. It is the staff, rather than the sleek executives, which creates the daily grist of either desirable or faulty public relations.

All the succulent smiles of the smooth executives, all the honeyed words of the publicity department, and all the grandiose promotional campaigns cannot counteract the bad public impression created by the personnel of an organization which fails to treat customers with con-

sideration and tact. Inversely, all the cheerful greetings of the big and little tycoons, all the mellifluous metaphors of the publicity department, and all the high-powered promotional campaigns, effective as they may be, fail to accomplish as much good for an organization as the daily grist of courteous, tactful handling of the public by the personnel.

Bow Wow!

On the subject of customer satisfaction, I recall the famous letter of complaint received by the Public Service Commission many years ago from an indignant subscriber of the Barking Dog Telephone Company. The name has been changed, so that it will give no offense to any telephone company, living or dead.

"Dear Sirs:

"The Barking Dog Telephone Company is an old, long drunken person. He spend his money getting drunk. He is drunk every day if he can get enough. His poles are rotten and falling down. He makes the excuse that the storm blow his line down. I told him that I would give you a description of the Barking Dog Telephone Company.

"It is a thing, about six feet one inch long, stays around the saloons of Barking Dog, Wisconsin, mostly gets drunk every day, and stays drunk and sassy. He bulls every one of his patrons. He gets hell from me. My wife is a patron. Oftentimes three or four days and you hear nothing. The last time about one week ago he submit his bill. I wrote on that bill when he put the line in repair he get his pay. He has not been around since. I heard he was somewhere taking mud baths. It seems that there is a place called Waukesha where they bury up drunks in the mud, and leave them for a week, and that drives out the whiskey, and then they return again for a new drink."

Obviously, the Barking Dog Telephone Company, in those days, did not enjoy good public relations.

Laurence Sterne has left to posterity an oft-quoted paragraph, namely:

"The Accusing Spirit, which flew up to heaven's chancery with the oath, blushed as he gave it in; and the Recording Angel, as he wrote it down, dropped a tear upon the word and blotted it out forever."

But the tears of embarrassment that may be shed by utility management over these frightful examples of public relations will never efface them from memory. Yet, on the asset side of the ledger there are many contributions of tact and courtesy which cause the Recording Angel to nod his head in approval.

We are in the midst of one of the most acute housing shortages that has ever scrambled "in-laws" under one roof. People watch the newspaper classified ads for housing vacancies with greater eagerness than they pursued nylons, white shirts, and cigarettes during the war. If a house, apartment, or even a furnished broom closet, is advertised for rent, and the telephone number given in the advertisement, it is quite a neat trick to call that number when the line is not busy. Every time one calls such a number, it sounds like the interior of an overcrowded beehive.

A telephone operator who handled a dozen unsuccessful attempts by a subscriber to reach a busy number, where a vacancy was advertised, performed a graceful stroke of public relations, when, an hour later, she rang the subscriber back and inquired, "Were you trying to reach Goldfish 1234? Here is your party now."

It made little difference to The Recording Angel that the apartment had been rented several thousand telephone calls before, and that the weary landlord, each time the phone rang, muttered hoarsely, with a groggy voice, into the transmitter: "The place is rented!"

Beyond Call of Duty

Because the operator went out of her line of duty to call the subscriber back, it made him feel that the telephone company was taking a personal interest in his efforts to find a place to live. This illustrates but one of a multitude of small employee courtesies that build good-will and establish effective public relations.

The bus driver who stopped in the middle of the block to pick up a passenger in a city where mass transportation is not geared to split-second schedules, performed an act of good-will, even though it caused the hard-boiled dispatcher to wince in agony over the lost minute.

It is the hot Saturday afternoon of a three-day week-end holiday which terminates the following Tuesday. Mamma blows out all the lights in the house by connecting up the vacuum cleaner, the electric fan, the hot plate, and the toaster, all on one circuit, while Father is trying to shave with his trusty electric razor. The current goes off leaving one half of father's face closely sheared and the other side looking as though he were one of the Smith Brothers Cough Drop Twins. Father frantically phones the electric company, apprehensive of spending the holiday week-end in the dark, illuminated only by decorative candles on the mantlepiece.

Creating Good Will

Thirty minutes later a bright-eyed harbinger of good cheer pushes the doorbell and inquires:

"Did you call the Mediterranean Gas and Electric Company?"

This creates more kindly feeling for the company and more effective public relations than if the president had invited Father over to his home that same evening for gin rummy.

There is a close relationship between the public relations field and the personnel director. In modern business and industrial relations, it is the personnel director who is liable for the selection of the staff and for the elimination of persons from the organization who fail to conform with its standards. This is a heavy management responsibility.

In selecting office personnel, the director must be extremely careful to choose persons who are in harmony with the spirit of the organization and to weed out those who fail to conform to its standards.

There are many routine measurements, including intelligence tests, job aptitude tests, and job evaluation studies that are available to the personnel director. Assuming that an applicant is able successfully to pass all the tests, simple or complex, required by an organization, there is an additional criterion which cannot be ignored, namely the personality test.

There are certain danger signals along the road. An applicant for a clerical, stenographic, or secretarial position who reports for an interview vigorously massaging her jaws with a wad of chewing gum is carrying a red flag, so far as the personnel director is concerned. She may be a modern edition of the Venus of Milo, of course the version that has shapely arms, and she may be able to take dictation at the rate of 200 words per minute. But if she is hired and later kneads gum in the face of a customer,

the director cannot complain that he had no advance warning.

If an applicant, who appears for an interview, is a contentious person who attempts to engage the personnel director in controversy, the latter cannot plead surprise when a department head later reports to him that this new employee has a talent for arguing with customers. It's just inbred in his nature to be belligerent and he will argue with anyone, customer or employer, because he loves to wrangle. He does not make a desirable accretion to the staff of an organization which is interested in harmonious customer relationships.

The Importance of Good Grooming

If a job applicant, man or woman, appears for an interview dressed like something that escaped from the comic page, regardless of his or her qualifications, these peculiarities of dress are a warning index of character eccentricities which will have a disturbing influence on office associates and on customers.

During the war the shortage of civilian stenographers was so acute it was whimsically observed that the customary test of qualifications consisted of blindfolding an applicant and having her step into a large room which contained a washing machine, a gas stove, and a typewriter; when the blindfold was removed, if she were able to tell which one was the typewriter, she had passed the test with a high grade. Recently the situation has improved greatly. The inefficient are falling by the wayside. It is again becoming the survival of the fittest, so the personnel director no longer has to hire a stenographer who punches the typewriter keys with her thumbs, or a salesman who snarls at customers.

There is just no use in hiring persons who are obviously unqualified, merely because there is a vacancy and no one else is available. An organization, if it is to preserve its esprit de corps, cannot lower its standards in the employment of office personnel who come in contact with the public. No matter how pressing the urgency or how great the temptation to fill a vacancy, it is better to leave the job unfilled than to hire an unqualified person. Otherwise the inevitable readjustment is painful, both to management and to the person who must be separated from the service. It is an old axiom that "Square pegs do not fit in round holes." But square pegs will not fit in square holes, if their stature is too small to fill its dimensions.

It is the responsibility of the personnel director, so far as he is able, to select only those employees who give promise of creating good customer relationships. One would not send out a salesman to discourage persons from buying his product. Nor should one employ an office salesman—for each member of the staff is an office salesman—who will handle customers tactlessly and discourteously.

It is also the duty of the personnel director to constantly evaluate and to ascertain whether the public relations standards of the organization are being maintained satisfactorily. He should cause the transfer of those persons who fail to meet the fundamental requirements of courtesy and tact. They should be moved to some department where they will not come in contact with the public, and, if the offense is grievous and repeated, separated from the service.

There was a period, within recent memory, when both the personnel director and the public relations director were considered merely rather unimportant clubs in the golf-bag of a large organization. This obsolete attitude of some important business executives toward the public relations director is epitomized by the statement of one conspicuously successful industrialist who, many years ago, after someone had observed that a certain person wrote advertising copy very well, replied:

Anyone Can Write, But

"Anybody can write who has a thesaurus and a dictionary handy."

Anyone who has wood, nails, brick, concrete, mortar and plaster can build a house, if he knows how to do it, but he must be an expert who knows where to place the materials.

Likewise, the modern business conception today is that anyone can write public relations messages well with the aid of a dictionary and a thesaurus, if he knows where to place words and ideas for their greatest effectiveness in achieving the objective of management.

Mark Twain once said, "A powerful agent is the right word. Whenever we come upon one of those intensely right words in a book or a newspaper the resulting effect is physical as well as spiritual, and electrically prompt."

Now, it is common practice for management to require the executive head of its public relations staff to participate in all important policy-making conferences which may affect public reaction toward the industry.

The archaic conception of the personnel director is the one which pictures him as a sort of index-clerk magician who extracts names out of a file with which to fill staff vacancies. But the modern conception of a personnel director is an executive skilled in selecting persons who have the necessary and peculiar attributes which especially qualify them for his particular organization; and who has a sort of psychic sense which enables him to eliminate those applicants who will be unable to meet the organization standards, either because of lack of qualifications, personality eccentricities or temperamental incompatibility.

High Cost of Good Public Relations

The cost of training new employees has always been high, and personnel turnover has been one of the dreaded diseases feared most by management. Now with increasing wages, high cost of living, and inflationary tendencies, the expense of attempting to train an unqualified office employee is almost a prohibitive luxury added to a bad investment. The desirable time to weigh the qualifications of a new employee is before he is hired, not after management has wasted several thousand dollars in fruitlessly trying to train him for a position, the specifications of which he cannot meet. In this respect, the personnel director performs one of his most valuable functions. If he is able to choose suitable persons for employment and to reject ones who will eventually have to be replaced, he earns his salary many times over every month of the year. A skilled personnel director is a sound investment for any firm which can afford a man with the necessary training and experience.

The Chicago *Journal of Commerce*, in a special article published not long ago, noted that in the past 10 years personnel directors have moved up rapidly in prestige and authority and that they now help to determine efficient office policies where formerly they were "merely master sergeants administering management orders unquestionably." The article quoted a survey made by the National Association of Personnel Directors showing that, but 10 years ago, approximately 2 per cent of the nation's personnel directors were company officers, but the present number is close to 25 per cent.

In some industries there has been a

(*Continued on page* 388)

Prevention and Extinguishing of Insulating Oil Fires in Power Stations and Substations

By Hollis K. Sels

Sponsor, Oil Fires Reports, Electrical Equipment Committee, EEI

THE observance of National Fire Prevention Week from October 5-11, inclusive, calls for a re-examination of fire risks. The need for greater emphasis on fire prevention is clearly shown by fire losses for the 12 months ending July 31, 1947, totaling $641,816,000. A brief article on Insurance appearing in Babson's Report for July 14, 1947, states: "A glance at the figures shows that fire losses for last year comprised the greatest fire waste since the National Board of Fire Underwriters started to compile figures. Any industry or firm which intends to keep fire protection would do well to examine carefully all types of fire hazards present in its plants or places of business." This increase has taken place at a time when many improvements have been made in methods of preventing fires and in fire extinguishing equipment.

Data on Insulating Oil Fires

While no detailed breakdown of the figures has been attempted for the electrical industry alone, it is believed that fire losses are sufficient to warrent a review of the methods of preventing and extinguishing insulating oil fires in power stations and substations. Since 1932 the Sponsor of Oil Fires Reports for the Electrical Equipment Committee of the Edison Electric Institute has accumulated data on major insulating oil fires in electrical equipment and reviews of these have been presented annually to members of the committee in the hope of developing recommendations or suggestions which may be used as guiding principles in design work. A designer should always be free to utilize ingenuity in the application of the spirit of these suggestions. He should, however, always be mindful of the need for preserving in each undertaking a careful economic balance between the importance of the plant to his electrical system as a whole with respect to size, location and other characteristics, and the cost of providing protection.

The brief review of the recommendations or suggestions as submitted herewith point out most of the salient features which should be recognized. Many of these suggestions are intended to point out desirable design practices and of necessity their application is limited to new installations. However, when old installations are to be reconstructed or replaced, these suggestions may well be reviewed and such of them as are practicable may profitably be adopted.

There are three principal aspects to consider in the development of methods for preventing and extinguishing fires; namely, the design and installation of electrical equipment, the maintenance of existing installations, and finally, the operation of the electrical equipment and extinguishing systems.

Design and Installation

In the design and installation of electrical equipment there are six general viewpoints from which to review specific fire hazards and provide measures for limiting fire losses. These are: location of apparatus; apparatus requirements; protective systems to clear faults rapidly; disposal of fire products; alarm systems; fire extinguishing systems.

In considering the location of apparatus, proper physical separation and isolation of equipment is of primary importance. In all such cases, all oil-filled equipment should be so located as not to endanger the total installation, which might result in excessive interruption to service. Such group segregation may contemplate arrangements ranging from a standard vault enclosure where justified by conditions of hazard and value, to curbs, pits or trenches, perhaps in conjunction with barriers, of capacity dependent upon the oil content of the equipment segregated and the discharge rate of any drains provided.

Consideration should be given to locating large oil-filled containers or oil-filled electrical equipment at positions which are not directly under support beams of building, since such beams are sometimes badly buckled by the heat from oil fires.

Where oil-filled equipment is installed close to a building, it is desirable that it be located away from windows and other direct openings above or adjacent to the equipment. Windows unavoidably located next to oil-filled equipment should be fitted with wire-glass.

Proper isolation can best be applied to outdoor installations, yet here, as well as indoors, total economy should not be lost sight of. Segregation by means of fire walls, barriers, fire doors, etc. and accessibility to equipment for fire-fighting purposes, is a function of the economy of the project as a whole, and the designer must follow that principle to avoid extremes of application.

Practices of economy may prohibit isolation or segregation of individual items of equipment in large indoor installations. Group isolation or segregation presents a feasible and economical means of localization of fires in such instances.

Special consideration should be given to the location of heating systems and, if necessary, metal shields should be provided so that any oil released cannot come in contact with hot surfaces.

Fire Fighters and Personnel

Accessibility around equipment is also an important consideration. When isolating equipment which may be subject to oil fires by means of walls, barriers or compartments, consideration should be given to access in the event of fire for such equipment as may be needed to extinguish fires. Two or more entrances should be provided to avoid dead-end passages which may limit both accessibility to fire-fighters, and escape of personnel. Where escape from an enclosed space is likely to be made difficult by the suddenness or severity of a fire, arcing, gas or smoke, consideration should be given to providing the door or doors with quick-opening panic-type hardware for ready release of latches in the direction of exit travel. If extinguishing equipment is fixed and automatic, the only problem is the escape of personnel, but where portable apparatus must be used, difficulty of access sometimes seriously impedes and delays putting out oil fires.

In determining the apparatus requirements so as to make the proper selection of electrical equipment, consideration

should be given to the amount of oil contained in the equipment as having a bearing on the possibility of fires. Other things being equal, the equipment with smaller amounts of oil should be preferred. In metalclad switchgear, oil-filled buses and other equipment, where practicable, a reasonable division should be made by means of stop joints to separate the volume of oil in order to limit the loss of oil in case of rupture.

The design and installation of oil piping is a specialized subject which should be entrusted to an engineer with proper experience in this field.

Means should be provided on large oil-filled equipment for the relief of pressure in case of internal failure. These devices should be so designed and located as to minimize the hazard from ejected oil and to prevent its being thrown on adjacent equipment. With such provision for relief, well-designed oil-filled equipment will have adequate mechanical strength to resist rupture in case of internal failure, although possibly not secondary explosions. Particular attention should be given to the mechanical strength of auxiliary additions, especially joints, to maintain this strength in case of failure.

Clearing Electrical Faults

Well-designed apparatus will be strong enough to withstand the surges or electrical fault to which it may be subject. Oil circuit breakers and other interrupting apparatus should be installed not only for the present, but also with a view toward future interrupting duties in a growing installation.

Careful consideration should be given to the selection of apparatus with the proper voltage rating, dielectric strength and thermal capacity. This applies particularly to small oil-filled equipment, such as instrument transformers.

Protective systems to clear faults rapidly should be developed on a general plan of adequate extent which will function under fault conditions that may be imposed upon them. Care should be taken that all oil-filled apparatus is included within such zones of protection as may be set up. The incidence and seriousness of an oil fire are often dependent upon the comparative speed with which an electrical fault is cleared.

Disposal of fire products, consisting of burning oil and extinguishing liquids, gas and smoke, is a major problem. It is not always desirable to drain the oil from burning equipment. However, draining facilities are usually provided for removal of oil when conditions are such that this procedure becomes necessary. The handling or disposal of oil from the emergency drainage system is a matter depending largely on local conditions, which makes it impracticable to set up specific recommendations. In many localities, drainage of oil to sewage systems is not permitted.

Confining the Fire

Openings in the floors of compartments containing oil-filled equipment should be avoided where practicable. Necessary openings, conduit trenches, ventilating ducts, drains, etc., should be designed so that they will not conduct burning oil, flame, and gases to other parts of the station or substation.

Experience has shown on external installations that beds of washed gravel or crushed blue stone of adequate depth suitably placed under and around oil-filled equipment, will be effective in reducing the intensity of fires from burning oil.

In the design of compartments, due consideration should be given to controlled ventilation, not only from the standpoint of dissipating the heat normally liberated by the equipment, but also to prevent accumulation of explosive gas mixtures and smoke. In large installations, the practicability of installing suitable special emergency ventilating equipment to remove smoke and gas may be found desirable or necessary in order that inspection of damage and restoration of service can be accomplished promptly. However, care must be used while a fire is in progress to see that operation of such ventilating means or fire confining methods does not aggravate the fire, remove fire-smothering gases introduced by automatic systems, or increase explosion hazards. Such ventilating ducts passing through occupied areas are potential hazards unless of sufficient strength to withstand explosive pressures.

In large and important installations, alarm systems providing fire indication should be considered along with electrical failure indication in the protective system.

In designing the fire-extinguishing system the development of plans for successfully fighting oil fires requires a familiarity with the conditions under which fires must be fought and a workable knowledge of the extinguishing devices available.

Adequate fire-fighting equipment should be available to every location. No arbitrary rule can be set up as to the amount and character of the equipment or size of units required. Each installation is a separate problem, and the following are prominent factors to be considered:

1. Importance of the equipment protected and risk of damage to adjacent property.
2. Personnel available for handling equipment.
3. Extent of area involved.
4. Conditions which affect portability of the equipment, such as various elevations, railroad tracks, stairways, ramps, etc.
5. Amount of oil at the location or in any part of the location subject to fire spread as restricted by space or by barriers.
6. Drainage conditions for disposal of spilt oil.

Careful consideration should be given to the choice of fire-fighting agent, or combination of agents, with due regard to the advantages and limitations of each type for each application. Two general methods of application of extinguishing equipment are available; namely, permanently-installed or fixed systems, and first-aid or portable apparatus. Certain precautions must be observed with each method to avoid danger to personnel and damage to equipment.

Importance of Speed

Speed of operation and application are of the utmost importance in extinguishing fires in the incipient stage and before extensive damage has been done. In electrical installations, extinguishers which may be used on "live" equipment are to be preferred and these consist of carbon dioxide, gas-powder, carbon tetrachloride types, and to a limited degree, water spray lines. Carbon dioxide extinguishers have been found to be especially effective in extinguishing fires in confined spaces, such as circuit breaker cells, wiring trenches, etc. Although occasional reignition may be experienced, they have also been found effective in extinguishing fires in constant-current transformers. Spray nozzles which produce a well broken up water spray, and do not under any setting or condition of stoppage allow the projection of a straight stream of water, have been proven safe for the application of water on energized electrical equipment and are effective on, and approved for, Class A, B and C fires. However, an accumulation of water from continued use of such extinguishers will create other electrical hazards around energized equipment. All

extinguishers which cannot be used on "live" equipment should be plainly so marked.

Cooperate With Local Firemen

If full equipment is not intended to be available for the extinguishing of such oil fires as may occur, adequate provision should be made so that the local fire department can employ its facilities to the best advantage. Means of providing alarm to the local department and the location of an adequate number of hydrants are two considerations. In the event that special conditions exist within the plant for which the local fire department is not prepared, it may be necessary to provide special nozzles or other equipment for their use in a location which is easily accessible to them. Caution should be employed to ascertain that such devices are adaptable to fire department equipment in such respects as coupling and thread sizes.

Maintenance of Existing Installation

In the maintenance of the existing installation there are four important measures to be taken; namely, retention of insulating strength in the equipment, replacement of worn parts, maintenance of the protective system in good operating condition, and maintenance of the extinguishing system.

In maintaining a high insulating standard, care should be given to all electrical insulation to keep it in reasonably clean condition even if special cleanings at more frequent intervals are necessary, since the presence of dirt, oil or other contamination may make possible conditions favorable to flashover or failure. Oil and insulation deteriorate with age, heat, acids, and moisture, and their replacement may be necessary to prevent failure. The maintenance of proper oil level in many types of electrical equipment is of greatest importance to minimize the possibility of fires caused by electrical leakage or arcs within the equipment.

The replacement of worn parts will help to avoid the causes of many fires. Such parts include overheated connections, worn contacts, cracked insulators, leaking gaskets, and many other causes of electrical fault, arcing and oil leakage.

The best protective system at installation only remains so as long as it is maintained in good operating condition. Properly scheduled inspection and testing will uncover the majority of causes of inoperative systems in time to remedy them before the system is required for trouble. Such cases include blown potential fuses, unintentionally grounded circuits, open circuits and operating coils, high-resistance contacts, departures from calibrated settings, and mechanical defects.

The extinguishing system, particularly hoses and nozzles, must be checked and maintained at frequent intervals by specifically assigned and trained personnel to make sure it is ready to be operated and that a sufficient supply of extinguishing media is available. The contents of any extinguisher which has been wholly or partly expended should be promptly replaced. Extinguishers should be equipped with a readily broken seal to give evidence of use or tampering. A record of the date of last inspection should be attached to the extinguisher. Piped-in water systems should be periodically flushed to free them of rust which may clog spray nozzles.

Operation

The successful operation of electrical equipment and the handling of the fire-extinguishing system involves seven considerations; namely, the avoidance of overstressing equipment, the avoidance of vulnerable operating setups, the training of personnel in the event of fire, cooperation of the local fire department, good housekeeping, vigilant supervision and inspection, and the maintenance of records.

Care should be exercised that equipment is not stressed excessively to the point of failure which may result in oil fires. The duties which originally existed when the equipment was installed may increase materially with the passage of time and the addition of new units, so that a continual check is necessary to make sure that its capabilities are adequate.

Care should be taken to schedule operation in such a way that the whole system is not made vulnerable to an operating setup where the failure of a single unit that may be exposed to a possible oil fire may jeopardize the entire operation.

In training of personnel, each employee should have his own function and duty in the event of fire adequately explained to him and should know where to go and what to do so that no delay results. Suitable fire drills should be conducted for this purpose. Employees should be acquainted with the limitations of any extinguishing equipment which is provided for their use and should be trained not to hesitate to call outside assistance when the equipment at hand is judged to be inadequate. Opportunity should be given to the employees to actually use the extinguishers on staged fires, including the wearing of masks if their use is to be expected. Where water-spray equipment has been provided, it is also advisable to stage demonstrations showing that water spray may be applied safely to energized electrical equipment.

Cooperation should be closely maintained with the local fire department in order that they may be familiar with the plant layout and any special fire risks in the plant which they may be called upon to fight. It is also wise to check over with them any special devices which may have been installed for their use, both to make sure that they are familiar with them and that they are adaptable to the apparatus existing in the fire department. This applies particularly to checking periodically thread sizes, water pressure under flow conditions and flushing or cleaning of water lines to free them of rust which may clog nozzles.

Good-housekeeping practices should be observed at all times. Combustible material should not be allowed to accumulate and oil leaks of every description should be taken care of promptly. Materials subject to spontaneous combustion should be properly stored, particularly during periods of construction, alteration or repair. Care should be taken to see that access to fire extinguishing devices is not impeded by stored material and that the operation of sprinkler devices is not obstructed by objects placed in close proximity.

Vigilance And Know-How

There is no substitute for vigilant supervision and frequent inspection by men familiar with the effectiveness and handling of all fire-fighting equipment as a requirement to keeping the plant in ready condition for the prevention, mitigation, and fighting of oil fires.

Data with respect to oil fires and explosions are summarized periodically by the Electrical Equipment Committee in order to reflect promptly experience gained in fire fighting and additional means of prevention. Special forms to accumulate these data are sent out semi-annually to members and correspondents of the Electrical Equipment Committee for prompt return to the Oil Fire Report Sponsor. Member companies not receiving this questionnaire are urged to obtain copies through the Secretary of the Electrical Equipment Committee at Headquarters and report on any similar major occurrences.

Paul Schoellkopf

PAUL A. SCHOELLKOPF, chairman of the board of directors of the Buffalo Niagara Electric Corporation and president of the Niagara Falls Power Company, died Sept. 30 in the Buffalo General Hospital. He was sixty-three years old and had been in failing health for the past few months. His home was at Lewiston Heights, near Niagara Falls, N. Y.

Mr. Schoellkopf was a grandson of Jacob J. Schoellkopf who pioneered in the development of hydro-electric power at Niagara Falls. His father was the late Arthur Schoellkopf who developed the Schoellkopf hydro-electric stations at Niagara Falls.

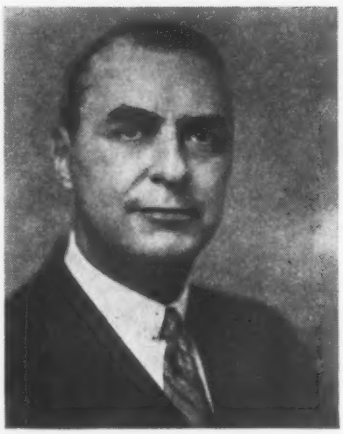
Born in Niagara Falls in 1884, Mr. Schoellkopf was educated at Cascadilla School and the University Preparatory School at Ithaca, N. Y., and in 1906 was graduated from Cornell University, of which he was a member of the board of trustees at his death. A year later he became associated with his father, Arthur, as assistant to the secretary and treasurer of the Niagara Falls Hydraulic Power and Manufacturing Company, one of the predecessors of the Niagara Falls Power Company. In 1913 he became general manager.

During World War I, several developing and distributing power companies at Niagara Falls were consolidated into the present Niagara Falls Power Company, and in 1920 Mr. Schoellkopf became president and continued in that charge until his death.

In 1925 the Niagara Falls Power Company joined with other major operating utilities in Western New York to form Buffalo Niagara and Eastern Power Corporation with Mr. Schoellkopf as its president.

He served in this capacity until 1929 when he was elected chairman of the board of directors. In 1929 the Niagara Hudson Power Corporation was formed from the consolidation of several major utility corporations serving a large portion of upper New York State. Mr. Schoellkopf became president of the corporation and held that position until September, 1933.

At the time of his death he was a director of Niagara Hudson Power Corporation. When several operating companies of the Western Division of Niagara Hudson were consolidated into Buffalo Niagara Electric Corporation in 1945, Mr. Schoellkopf became chairman of the board and also continued as president of the Niagara Falls Power Company.



MR. SCHOELLKOPF

Mr. Schoellkopf was a former member of the Advisory Committee of the Edison Electric Institute. He was also a member of the Niagara Frontier State Park Commission; a member of the Niagara Frontier Authority; a trustee of the Niagara Falls Memorial Hospital; chairman of the board of the Power City Trust Company, Niagara Falls; director of the Marine Midland Corporation, Trico Products Corporation, Spirella International, Inc., and the Niagara Falls Hotel Corporation. He was a member of the Niagara Falls Country Club, Niagara Club, Buffalo Country Club, Buffalo Club, Bath Club and the Broad Street Club of New York.

Announcement of Changes in Electrical and Photometric Units

IN pursuance of decisions of the International Committee on Weights and Measures, the National Bureau of Standards will introduce as of Jan. 1, 1948, revised values of the units of electricity and of light. Although the definitions of the units and the methods of fixing their magnitudes will be quite different from those of the present practical systems, the changes in magnitude in general will be so small as to affect appreciably only measurements of high precision. In certificates for standards and instruments issued by the Bureau during 1947, values will be given in both the old and the new units.

This announcement was made by the National Bureau of Standards on May 15, 1947, in Circular C459, which gives a short account of the development of new international agreements on practical units of electricity and of light.

The electrical units of the "international" system will be superseded by those of the "absolute" system derived from the fundamental mechanical units of length, mass, and time by use of accepted principles of electromagnetism, with the value of the permeability of space taken as unity in the centimeter-gram-second system or as 10^{-7} in the corresponding meter-kilogram-second system. This revision constitutes a return to the basic principle, always recognized as desirable, of having the electrical units consistent with the fundamental mechanical units.

The international ohm and volt now in use are slightly larger than the corresponding absolute units; consequently, numerical values of resistance and voltage are slightly larger when expressed in absolute units than when expressed in international units. In the United States the factors recommended for conversion to the absolute basis are 1.000495 for resistances and 1.00033 for voltages. For power or energy therefore the factor is 1.000165, but for the most purposes the round value 1.0002 is amply precise.

The new system of photometric units takes as the primary standard a blackbody radiator operated at the temperature of freezing platinum. The "candle," unit of intensity, is defined as one-sixtieth of the intensity of 1 square centimeter of such a radiator. Other units are derived from the candle, with the provision that when differences of color are involved the evaluation shall be made by means of standard spectral luminosity factors that have been adopted by the International Commission on Illumination and the International Committee on Weights and Measures. For the types of lamps now in common use the ratings under this new system will be practically the same as those now in effect.

Further details may be obtained by writing to the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. The price of Circular C459 is five cents a copy.

Branch Circuit Protection Committee Reports Progress

THE EEI-AEIC Joint Committee on Branch Circuit Protection* that has been continuously active since last December, advises that the completion of a major part of its investigation is in sight. Preliminary tests and studies have been made on time-current characteristics of conductors and protective devices and current requirements of domestic appliances. The design of properly coordinated protective devices of course depends entirely on the characteristics of conductors and the load to be served. Verified tests are therefore now necessary in order to complete the work.

Approval has been given by the sponsoring bodies for the committee to secure the services of a recognized testing laboratory to carry out the necessary test schedule. The program will include accurate determination of the time-current characteristics of present day branch circuit conductors in various combination of sizes and installation in conduit and cable.

The committee has carried out an industry-wide field survey on branch circuit protection in an effort to determine the prevalence of fire hazards through misapplications and tampering with fuses. A preliminary analysis of the results of the survey indicates the nature of the data is such that it is difficult to draw firm conclusions. While some appreciable over-fusing and tampering with fuses is indicated, there is little tangible evidence that such practices actually caused fires. The committee recognizes that it is desirable to minimize the potential hazard and the committee program is being conducted with this in mind.

During the progress of the study consideration has been given to a number of proposed solutions to the plug fuse problem as it now exists in the electrical industry. One of these proposals contemplates the use of plug fuses that will provide an acceptable degree of tamper-resistance when installed in specially designed fuse holders or, when installed in Edison base fuse holders, in a suitable adapter. Considering past experience and future requirements, the committee believes that additional tamper-resistant features for plug fuses can only be made workable and accomplish the desired result if made interchangeable with the present standard Edison base fuse. That is, a new type of tamper-resistant fuse holder or adapter for existing Edison base fuse holder may be made, but the new fuse should also be usable in the Edison base fuse holder with or without the adapter. That it can be done has already been demonstrated by several differently designed models. Arrangements are now being made to contact all plug fuse manufacturers to determine what they may now have available or developments that may be disclosed, and to solicit their cooperation with the committee in arriving at a solution of the plug fuse problem.

The results of the conductor tests referred to above, will provide information for use in a review of the most desirable time-current characteristic for over-current protective devices. In this connection data which have been collected on motorized appliances indicate the need for careful consideration of time-delay features to prevent unnecessary operation of overcurrent protective devices on inrush currents caused by the starting of motors. The cooperation of fuse and circuit breaker manufacturers will be sought in this phase of the study.

*Report on the organization and program of this committee was given in the May, 1947 issue of the BULLETIN.

Pennsylvania Power & Light Sets Up 15 Agricultural Scholarships to Penn State

FIFTEEN scholarships have been established at the Penn State College by Pennsylvania Power & Light Company, Dr. Ralph Dorn Hetzel, president of the college, announced today. The scholarships are in the School of Agriculture and, according to Dr. Lyman E. Jackson, dean of the school, will be awarded to deserving boys interested in agriculture and residents of the utility company's service area. In offering the scholarships, the electric company's president, Chas. E. Oakes, stated that the purpose was "to stimulate interest in agriculture, one of Pennsylvania's greatest resources."

"Today with low-cost electric service, the willing fast-working helper in nearly every farm task, it is clearer than ever that agriculture holds as many opportunities for our American youth as does industry," said Mr. Oakes. He pointed out that Pennsylvania is one of the great agricultural states of the nation. "These scholarships," he said, "are part of an effort to keep this state among the nation's leaders. One of industry's responsibilities is to keep farm youth interested in agriculture as a vocation. We must remember industry and agriculture work together to assure our national prosperity."

Under the PP&L plan six freshmen will receive sums of $100 each, and three sophomores, sums of $200 each during 1947-48 term. In addition to the previous sums, three juniors will receive $200 each in the 1948-49 term. In the same fashion three senior scholarships of $200 each will be added in the 1949-50 term. This will make a total of 15 scholarships per year to be continued until further notice.

According to Mr. Oakes, recommendations for the scholarships will be made through school superintendents, high school principals, teachers of vocational agriculture, county agricultural extension representatives and representatives of Penn State College with final choice of appointments resting with the college.

Further information about the scholarship is available through the office of the Dean of Agriculture at Pennsylvania State College.

Freedom Train Reminds U. S. Citizens of Democratic Ideals

(*Continued from page* 363)

tric Company. The Pullman Company provided the three cars which carry the train's personnel; the Sante Fe supplied an express-baggage car; and the Pennsylvania Railroad Company rebuilt three all-steel coaches into cars for exhibiting the documents.

The Freedom Train will travel a total of about 29,000 miles over 94 different railroads. A staff of 30, exclusive of the train crew, will care for and protect the irreplaceable documents. The armed guards are members of the Marine Corps.

Pennsylvania Electric Association Holds Annual Industry Conference

RECORD-BREAKING attendance of over 700 electric utility men from Pennsylvania electric service companies marked the fortieth annual meeting and industry conference of the Pennsylvania Electric Association, at the Benjamin Franklin Hotel, Philadelphia, Sept. 23 and 24. The two-day session included a series of addresses on the electric industry's outlook, dealing with problems related to management, personnel, service, public relations, expansion programs, and general economic trends as they affect electric service companies.

G. W. Ousler Elected President

George W. Ousler, Vice-President in Charge of Sales, Duquesne Light Company, Pittsburgh, was elected President of the Association for the 1947-1948 term, succeeding Charles E. Oakes, President of the Pennsylvania Power & Light Company, Allentown.

Vice-Presidents for the coming administrative year are: W. H. Doran, Vice-President of the Metropolitan Edison Company, Reading, Pa.; D. W. Jardine, President of the Pennsylvania Electric Company, Johnstown, Pa.; and George R. Conover, Vice-President of the Philadelphia Electric Company, Philadelphia.

Highlight of the opening session on Sept. 23 was an address by Horace P. Liversidge, Chairman of the Board, Philadelphia Electric Company, on national aspects of the electric industry.

Commenting on the industry's 5 billion dollar expansion program, Mr. Liversidge said, present indications are that about 40 per cent, or 2 billion dollars, will be provided from within the industry, while the remaining 60 per cent will require about 3 billion dollars of new financing, or an average of 600 million dollars annually over the next five years. In Mr. Liversidge's opinion, this gigantic program can be handled by private enterprise, without government aid.

In summing up, Mr. Liversidge pointed out the responsibility of electric utilities in maintaining high standards of service and the industry's "unique position to make an even greater contribution to the nation than it has in the past."

Dr. Sumner H. Slichter, Lamont Professor, Harvard University, addressed the conference on the present business outlook. In establishing the background for his forecast, Dr. Sumner cited a number of points as healthy conditions in the present economy—conditions which would tend to limit the severity of any recession. Among them were unsatisfied consumer needs; prices too low to equate supply and demand; consumer indebtedness low in relation to consumer incomes; consumer expenditures low in relation to their holdings of cash and bank deposits; inventories low in relation to sales; rate of private construction low in relation to the gross national product; and the fact that the accumulated need of business for more capital is very great.

Stressing the opportunity for business and the government to take certain measures which will keep the economy stable and minimize the danger of a depression, Dr. Slichter outlined the following steps to be taken by business: (1) continue to operate at a low level of inventories; (2) intensify efforts to raise output per man-hour; (3) postpone expenditures which do not promise fairly immediate increases in output; (4) keep extension of credit to customers as low as possible; (5) avoid dividend increases and finance capital needs by plowing back earnings rather than by borrowing from banks; (6) keep present prices well below the level which present demand would justify; (7) resist wage increases which exceed increase in output per man-hour or which are not plainly justified by special conditions.

Management Responsibilities Cited

An entire half-day session was devoted to management's responsibilities—to employees, investors, and the public. Ralph L. Lee, of the Employee Cooperation Staff, General Motors, who spoke on responsibilities to employees, stressed the importance of the individual in the business organization. Responsibility to investors was discussed by Edward Hopkinson, Jr., of Drexel and Company, Philadelphia, while Carlton Ketchum, Public Relations Specialist, dealt with the third phase of this subject.

Other conference speakers were L. E. Osborne, senior operating Vice-President of Westinghouse Electric Corporation, who talked on "Industry's Place in the Changing Economic World"; Dr. J. E. McCarthy, Dean, College of Commerce, Notre Dame University, who spoke on training junior personnel for larger responsibilities; J. Carlton Ward, President of Fairchild Engine and Airplane Corporation, whose subject was, "Can the Atom be Harnessed for Power?"; and Gene Flack, Director of Advertising, Sunshine Biscuits, Inc., luncheon speaker at the second day session.

Present Safety Awards

Trophies were awarded the winners in the Association's Annual Safety Contest by President Oakes. Metropolitan Edison Company, Reading, Pa., received first place trophy among companies averaging 200,000 or more manhours monthly; Pennsylvania Water & Power Company, Baltimore, Md., won first in the group averaging 60,000 to 200,000 monthly; and Natrona Light & Power Company, Natrona, Pa., placed first among companies averaging less than 60,000 manhours monthly.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946

Of EDISON ELECTRIC INSTITUTE BULLETIN, published monthly at Philadelphia, Pa., for October, 1947.

State of New York. } ss:
County of New York. }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Wilgar Coleman, who, having been duly sworn according to law, deposes and says that he is the Editor of the EDISON ELECTRIC INSTITUTE BULLETIN, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management . . . etc., of the aforesaid publication for the date shown in the above caption, required by the act of August 24, 1912, as amended by the acts of March 3, 1933, and July 2, 1946 (section 537, Postal Laws and Regulations) . . . to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, EDISON ELECTRIC INSTITUTE, 420 Lexington Avenue, New York City 17; Editor, Wilgar Coleman, 420 Lexington Avenue, New York City 17; Managing Editor, none; Business Manager, none.

2. That the owners are EDISON ELECTRIC INSTITUTE—not incorporated—trade association; Charles E. Oakes, President, 420 Lexington Avenue, New York City 17; K. B. Crumb, Treasurer, American Gas & Electric Service Corp., New York; Mae B. Woods, Secretary, 420 Lexington Avenue, New York City 17.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions upon which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

WILGAR COLEMAN,
Editor.

Sworn to and subscribed before me this 24th day of September, 1947.

(Seal) MAE B. WOODS,
Notary Public, Queens County.
(My commission expires March 30, 1948)

Accident Prevention Committee Meeting

E. J. Kreh, *Chairman*

THE thirty-sixth meeting of the Accident Prevention Committee was held on September 8 and 9 at EEI Headquarters with about 43 members and guests in attendance.

E. C. Rue reported that most of the illustrations have been selected for the accident prevention manual "The Application and Care of Rubber Protective Equipment" and that it will be ready for publication later this fall.

A project was initiated to prepare another in the series of accident prevention manuals to be entitled "The Use and Care of Live Line Maintenance Equipment."

The results of a survey of grounding practices for pole mounted distribution transformers was reported by R. P. Douglas. Reports from 107 companies operating over 2,250,000 distribution transformers indicate that 64 percent of the transformer cases are normally ungrounded although the trend over recent years has been toward an increase in the practice of grounding cases.

W. R. Smith presented a study of the more than 200 successful cases of resuscitation reported to the Edison Electric Institute since 1933 in connection with the Edison Medal Awards. Analyses of these cases reveal trends comparable with those indicated by the annual analyses of fatal accidents. It shows that with few exceptions these accidents were the result of departures from that which has come to be recognized as best practice. This best practice, as expressed in much the same terms in the safety rules and procedures of individual electric light and power companies, has come from experience. This fact should give emphasis to the significance of such rules and justify adherence to them. A report of this study will soon be published. It presents a dramatic appeal to men and supervision to insure themselves that they are equipped with knowledge and skill in the use of approved life saving procedures. It also invites, with more effective appeal, the adoption of Safe Practices which will guard the life and limb of men in the electric industry.

The ninth in the series of Exchange Bulletins describing unusual accidents or those of special interest was presented by W. R. Smith.

E. E. Beck presented a draft of a booklet illustrating how cooperative self-training can improve efficiency and reduce accidents without specially trained instructors, at minimum cost and without interference with the work program. This type training is built around the crew and Mr. Beck also plans to prepare a supplementary booklet containing advice to foremen on the conduct of this type of training.

On behalf of T. R. Claffy of W. H. Salisbury and Company, R. M. Godwin reported that further test of rubber gloves coated with Neoprene to reduce corona cutting has produced some conflicting results indicating the need for more exhaustive tests and the desirability of engaging a neutral laboratory to establish a standard test which can be reproduced in any laboratory.

A project was initiated to assemble data on safe practices in the unloading, storage and transportation of poles.

On behalf of W. F. Brown the Secretary reviewed the final 1946 accident experience of the electric light and power industry covering 207 companies. Comparing 1946 with 1945—

- Number of lost time accidents per million manhours increased 11 percent to 14.81, the highest frequency rate during the past sixteen years.
- Number of days lost per thousand manhours decreased 12 percent to 1.72, the lowest severity rate, by a small margin, during the past sixteen years.
- Number of fatal accidents decreased 11 percent and fatalities per thousand employees reached the lowest level during the past twenty-four years.
- Number of days charged to lost time accidents decreased 1 percent. However, deducting the time charged for fatalities, the number of days charged to non-fatal accidents increased 34 percent.

This summary indicates that there were not only more accidents but that the non-fatal accidents were more severe. As in previous years accident rates tended to increase with decreasing size of company. Although there was substantial improvement in the overall severity rate, both the frequency and severity rates for the electric light and power industry are worse than the averages for all industry.

Preliminary accident experience data for the first six months of 1947 obtained from 22 companies represented on the Accident Prevention Committee and comprising about 35 percent of the total manhours covered in the complete annual report was also presented. Comparisons with approximately the same preliminary coverage for the entire year 1946 indicate about an 8 percent reduction in the frequency rate and substantially the same severity rate. However, there is a sharp upturn in fatalities. This sample group of companies which reported only 20 fatalities for the entire year of 1946 already have experienced 15 for only the first half of 1947.

D. C. Stewart presented a summary of fatalities for the year 1946. No unusual trends are evident. Although the fatality rate declined in 1946 the general pattern remains the same as during the five previous years for which detailed analyses have been made.

A. L. Dowden of the Liberty Mutual Insurance Company presented a sound-slide film entitled "Let's Figure It Out" which is based on data from the five-year analysis of fatalities compiled by D. C. Stewart and which appeared in the August 1947 issue of the EEI BULLETIN. The film illustrates the salient points brought out by this analysis, outlines the underlying causes of the accidents and indicates the means for their prevention.

A round table discussion led by D. C. Duncan included description and discussion of several specific accidents of unusual nature.

E. S. Miner of the American Telephone & Telegraph Company distributed copies of the "Safety Observation Plan" used at all levels of supervision in the Bell System to observe work while in progress in order to detect unsafe practices, determine their underlying causes and apply appropriate measures to eliminate them. Mr. Miner pointed out that this plan takes up where other safety programs stop but he emphasized that a definite routine must be established to make the plan work.

A Catalog of
E.E.I. Publications
is available upon request to:
EDISON ELECTRIC INSTITUTE
420 Lexington Ave.
New York 17, N. Y.

PERSONALS

PHILIP SPORN has been elected president of the Atlantic City Electric Company, succeeding N. M. ARGABRITE. On his retirement from the presidency, which he held since August, 1945, Mr. Argabrite will have completed 40 years in the utility field. Mr. Sporn also is president of the American Gas and Electric Company and its subsidiary operating companies, including Atlantic City Electric.

B. L. ENGLAND, vice president and general manager of Atlantic City Electric, will continue in charge of the company's operations and will be senior officer in Atlantic City.

JACOB T. BARRON, vice president in charge of Electric Operation, and WATSON F. TAIT, JR., assistant general manager, Electric Department, Public Service Electric & Gas Company, who completed 40 and 25 years' service with the company, respectively, were guests at an anniversary dinner Sept. 2 at the Hotel Essex House, Newark. Approximately 500 fellow-workers, representing all departments, attended.

Donald C. Luce, general manager, Electric Department, presented Mr. Barron with an engraved silver tray and Mr. Tait, a traveling bag, on behalf of those present. Mr. Barron presented Mr. Tait his gold service emblem, denoting completion of 25 years' service with the company.

The program was featured by the presention of a skit depicting the highlights in the lives of Messrs. Barron and Tait. The skit was prepared by H. Watson Tietze and was presented by Leo W Geisler, Edward M. MacIntosh, George F. Schiffmayer, Oscar Bauhan and Ralph S. Wetsten.

FRANKLIN T. GRIFFITH, prominently connected with the electric utility industry in the Pacific Northwest for more than 50 years, has retired as chairman of the board of the Portland (Ore.) General Electric Co., following the practical completion of the plans for the impending reorganization of the company. Mr. Griffith served as president of the company from 1913 until 1940, when on his seventieth birthday he assumed the duties of chairman.

For many years Mr. Griffith took an active part in the affairs of the old National Electric Light Association, serving as president 1924-25. As chairman of the Association's water power development committee he did work of immense value in furthering the development of water power in the Northwest. He won wide recognition as a national legal authority on riparian rights and water power and hydroelectric jurisprudence. He is also a past president of the Northwest Electric Light and Power Association.

E. H. WILL, formerly president of the El Paso Electric Co., El Paso, Tex., has returned to his native state, Virginia, to become general manager of operations of Virginia Electric & Power Co., with headquarters in Richmond, Va.

Mr. Will entered the engineering department of the Virginia Electric & Power Co. in 1922. Later he was transferred to Norfolk in charge of the engineering department and subsequently was promoted to assistant superintendent of the electric department. He also occupied the position of assistant to the vice president of Vepco and for four years from 1928 to 1932 was manager of the Suffolk district of the company. For three years he was assistant to the general manager of the electric department of which he now becomes the head.

Mr. Will has been in Texas since 1935, where he was, first, superintendent of El Paso Electric Co. and in recent years has been president of that company.

W. W. LYNCH, formerly vice president of the Texas Power & Light Company, Dallas, has been made executive vice president of the company. JOHN C. YOUNG, who has been associated with the company for 24 years, has been made a director and vice president. Mr. Young will continue his position as district manager at Waco.

Promotion of WALTER D. MYERS, manager of the electric sales department, to director and vice president in charge of sales of the Louisville Gas & Electric Co., has been announced.

Mr. Myers was first employed by the Kentucky Electric Co., a predecessor company, in 1908. In 1929, he became commercial manager, and in 1939 was promoted to the position of manager of electric sales. The appointment of Mr. Myers fills the vacancy created by the retirement of ROBERT MONTGOMERY, vice president and a director.

J. RUSSELL RAMAGE, assistant manager of electric sales, has been appointed manager of that department, succeeding Mr. Myers, and E. V. FREEMAN has been promoted to the position of assistant manager. Mr. Ramage has been with Louisville Gas & Electric Co. for 36 years and Mr. Freeman for 20 years.

JACK P. LEWIS, assistant to the manager of the Stamford division, Connecticut Power Co., has been appointed director of engineering for the company. Mr. Lewis was graduated from Rensselaer Polytechnic Institute in 1930, receiving the degree of doctor of engineering there in 1933. He joined the Stamford utility permanently on completing his college training; was electrical engineer from 1940 to 1942 and division engineer from 1942 to 1943.

WALTER N. NELSON has been named assistant to the manager, Stamford division. He joined the company in 1935 after serving as a field and office engineer on power and industrial plant construction with the Stone & Webster Engineering Corp., and has been division engineer since 1943.

ROBERT H. PEARSON, supervisor of personnel, Connecticut Power Co., has assumed the duties in connection with personnel work in the Stamford division formerly carried by Mr. Lewis.

Central Maine Power Co., through President W. F. Wyman of Augusta, has appointed ROBERT E. BRACKETT manager of the southern division with headquarters at Portland; GEORGE E. HAGGAS was named division plant manager, and DONALD M. LIBBY manager of a newly established Portland district. FRED D. GORDON, vice president of the company and former manager of the division, will continue as a director of Central Maine Power, vice president as hitherto, and as advisory consultant on southern division activities.

Mr. Brackett will supervise the office, stores, personnel and electrical distribution and sales of the division, which includes most of Cumberland and York counties. A graduate of the University of Maine, he joined the predecessor Cumberland County Power & Light Co. in 1929 as auditor and assistant

treasurer, soon becoming director of the auditing department and in 1935 assistant secretary. Since the merger with Central Maine in 1942 he has been assistant treasurer of the latter. Mr. Haggas, an engineering graduate of the University of Michigan, joined the CCP&L company in 1915 as chief engineer, later being made assistant to the general manager and then plant superintendent and assistant to the vice president, southern division. Mr. Libby, a University of Maine graduate in engineering, joined the CCP&L in 1922 in the meter and general service department. In 1922 he was made assistant to the power engineer and in 1928 power engineer. He served in both world wars, holding a colonelcy at his discharge in 1946, when he became rate engineer. Mr. Gordon entered the industry in 1896, and has had a distinguished executive career with the utilities now merged with the CMP at Lewiston and Portland.

RICHARD F. HARTMAN has been appointed agricultural representative for the Central Power & Light Co., Corpus Christi, Tex. Formerly a county agent for the A & M College Extension Service, Mr. Hartman will cooperate with authorized agricultural agencies and other groups in furthering power development in south Texas.

FREDERICK W. FISHER, for the past 20 years director of personnel and public relations for the Rochester Gas & Electric Corp., has retired. Mr. Fisher had been identified with the Rochester utility for more than 38 years.

Recent personnel changes in the engineering department of the Mississippi Power & Light Co.'s headquarters at Jackson have been announced.

JERE F. HARRISON, veteran engineering official, was recently named engineering consultant for the company. In almost two decades with the organization, Mr. Harrison has played a leading role in the development and progress of the organization, having served as both chief engineer and general superintendent in charge of engineering, operation and construction.

Named chief engineer is J. B. FOUNTAIN, an outstanding member of the engineering department for almost 20 years. RAY W. BRASWELL, formerly operating superintendent, was named operating and engineering manager.

Mr. Harrison joined Mississippi Power & Light Co. in 1928 as construction superintendent, after previous experience in utility construction and engineering in the Carolinas, Georgia and Florida. Assuming his duties with Mississippi Power & Light, when its system facilities were in the early stage of development, he pioneered the first system expansion program. In his capacity as engineering consultant in the executive department, he will have responsibilities in the administration of the current $20,000,000 expansion program.

Mr. Fountain started with the company in 1928 at Vicksburg as a student engineer and since that time has distinguished himself as he successfully handled one responsible position after another in MPL engineering operations. Just previous to his last promotion, he had been engineering superintendent of the company in charge of all electrical and civil engineering functions. In his new capacity as chief engineer, his responsibilities will include the planning and designing of all specifications and standards of all electrical physical property of the company, and the overseeing of all major construction projects, engineering surveys, maps, drafting, etc. Mr. Fountain is a member of AIEE.

Mr. Braswell joined Mississippi Power & Light last year following an association with Louisiana Power & Light Co. and assumed the duties of operating superintendent. In his new position, Mr. Braswell will be in charge of the operating, engineering, construction and maintenance of all physical property, both electric and gas, and in addition will oversee the preparation and control of construction budgets, operating analyses, purchasing, etc.

Announcement has been made by Metropolitan Edison Company, Reading, Pa., of two important personnel changes in the ranks of junior executives within the organization.

J. RYAN BINGAMAN, former manager of power sales for the Company's Central Division, located in Reading, has been promoted to the position of manager of industrial development for the entire Metropolitan Edison System, centering principally around Reading, Easton, Lebanon, Hanover and York. His office will be located in Reading.

PAUL A. KINSEY has been promoted from the position of director of rural development for the system to division sales manager, Central division. Mr. Kinsey will be in charge of all sales activities of the company, including industrial, commercial and residential sales forces in the Central division.

Planned Home Lighting Program Released by EEI

A PROMOTIONAL and educational program on planned residential lighting, fifth in a series of campaigns to sell the idea of Planned Lighting in as many major markets, has just been released by the Edison Electric Institute, according to Ralph P. Wagner, chairman of the Commercial Division. The program is the most comprehensive ever offered to the electrical industry for use in the home lighting field, Mr. Wagner said.

Among the materials offered in the campaign are an educational booklet on the relationship between light and sight; two customer booklets, on modernizing existing lighting, and planning the lighting for new homes; six direct mail folders; a booklet illustrating the advantages of planned lighting to the home builder; a large-size home lighting visualizer; three lecture demonstrations; a series of newspaper advertisements, and a planned lighting recommendation form, for use by the lighting representative.

Emphasizing the opportunities offered to the electrical industry in the home lighting market, Mr. Wagner said that the average wired home today has 26 light sockets, yielding about 1250 watts of connected load. "For really adequate lighting, the typical American home needs four times this amount of light," Mr. Wagner said.

This tremendous potential can be realized only through complete, well-balanced sales programs sponsored by every electric company, he continued. "It must be realized that such programs require much time to get underway, and to produce substantial results. Today is none too early for the average electric utility to begin preparing and planning for the widespread, intensive promotion of Planned Lighting in its area."

Copies of the Residential Lighting plan book, with a complete set of the supporting promotional materials, are available to utility commercial executives at the Edison Electric Institute, 420 Lexington Avenue, New York 17, N. Y.

Electricity Production in U. S. Now at Rate of 300 Billion Kwhr Per Year

(*Continued from page* 368)

The upper line represents the combined production of the electric industry and isolated industrial plants such as subways, street railways, mines, etc.

The electric companies have undertaken their expansion program in spite of rising construction costs. Increases in construction costs of 30 to 100 per cent above prewar prices were reported in 1946. The average was probably about 50 per cent.

In considering these figures, it should be observed that changes in cost bring engineering opportunities. It is the function and instinct of engineers to pull down costs and improve net results. Assuming the value of money to be stabilized approximately where it now is, it may safely be predicted that in 10-years' time the engineers will have generating costs, transmission and distribution costs, whether measured on a capacity basis, a customer basis or a kilowatthour basis, back down near the prewar level.

Exclusive of electricity generated for their own use by street railway companies, industrial plants, etc., the business-managed electric companies in 1932 were generating about 94 per cent of the power supply of the United States and selling about 94 per cent of the power output. In 1946 they were generating 82 per cent of the total production for sale and were selling 87 per cent. (This latter figure includes a percentage of the power generated in government plants.) Fig. 6 shows this change. These figures reveal the vitality, the sound engineering and management and progressive qualities of the business-managed companies.

How to Lose Friends—How to Make Them

(*Continued from page* 378)

recent tendency to coordinate the work of the personnel and public relations directors.

The careful selection of competent personnel and the imbuing in the staff of a public relations policy which has, as its foundation, tact and courtesy, will pay lush dividends in improved customer relationships.

Concerning these twins of public relations—courtesy and tact—let me conclude with the observation of Ralph Waldo Emerson, "Life is not so short but that there is always time enough for courtesy."

CONVENTIONS AND MEETINGS

1947

OCTOBER

6-7	Prime Movers Committee, EEI, Benjamin Franklin Hotel, Philadelphia, Pa.
6-7	Electrical Equipment Committee, EEI, Benjamin Franklin Hotel, Philadelphia, Pa.
6-8	American Gas Association, Annual meeting, Cleveland, Ohio.
6-8	Association of National Advertisers, Atlantic City, N. J.
6-10	35th National Safety Congress and Exposition, Chicago, Ill.
7-8	National Farm Electrification Conference, Claypool Hotel, Indianapolis, Ind.
8-11	International Association of Electrical Leagues, Statler Hotel, St. Louis, Mo.
9-10	Transmission and Distribution Committee, EEI, Benjamin Franklin Hotel, Philadelphia, Pa.
13-15	Western Section, International Association of Electrical Inspectors, Mount Royal Hotel, Montreal, Can.
15-18	American Society of Civil Engineers, Fall Meeting, New Orleans, La.
16-17	Missouri Valley Electric Association, Accounting Conference, President Hotel, Kansas City, Mo.
16-17	Pennsylvania Electric Association, Transmission and Distribution Committee, Fort Ligonier Hotel, Ligonier, Pa.
20-22	Eastern Section, International Association of Electrical Inspectors, Seaside Hotel, Atlantic City, N. J.
21-23	American Standards Association, Waldorf-Astoria Hotel, New York, N. Y.
23-24	Pennsylvania Electric Association, Prime Movers Committee, Benjamin Franklin Hotel, Philadelphia, Pa.
27-29	Southern Section, International Association of Electrical Inspectors, George Washington Hotel, Jacksonville, Fla.
27-30	National Electrical Manufacturers Association, Hotel Traymore, Atlantic City, N. J.
29-31	Southeastern Electric Exchange, General Sales Conference, Atlanta Biltmore Hotel, Atlanta, Ga.
30-31	Pennsylvania Electric Association, Electrical Equipment Committee, Benjamin Franklin Hotel, Philadelphia, Pa.
30-Nov. 1	Missouri Valley Electric Association, Rural Round-Table Discussion, Sales and Rural Conference, Skirvin Hotel, Oklahoma City, Okla.

NOVEMBER

3-7	International Lighting Exposition, Stevens Hotel, Chicago, Ill.
12-13	Southeastern Electric Exchange, Fall Convention, Hotel Roosevelt, New Orleans, La.
13-14	Pennsylvania Electric Association, Communications Committee, Lord Baltimore Hotel, Baltimore, Md.
19-21	Joint Convention of Gas & Electric Sections, Commercial & Technical Divisions, Wisconsin Utilities Association, Schroeder Hotel, Milwaukee, Wis.
21-22	New Jersey Utilities Association, Seaview Country Club, Absecon, N. J.

DECEMBER

1-5	The American Society of Mechanical Engineers, Chalfonte Haddon Hall, Atlantic City, N. J.
3-5	52nd Annual Congress of American Industry, National Association of Manufacturers, Waldorf-Astoria Hotel, New York, N. Y.

JANUARY

26-30	American Institute of Electrical Engineers, Pittsburgh, Pa.

FEBRUARY

5-6	Missouri Valley Electric Association, Power Sales Conference, President Hotel, Kansas City, Mo.
9-10	Transmission and Distribution Committee, EEI, New Jefferson Hotel, St. Louis, Mo.

MARCH

14-18	National Electrical Manufacturers Association, Edgewater Beach Hotel, Chicago, Ill.

APRIL

6-8	Fourteenth Annual Sales Conference, EEI, Edgewater Beach Hotel, Chicago, Ill.
7-9	Missouri Valley Electric Association, Engineering Conference, President Hotel, Kansas City, Mo.
12-14	National Conference of Electric and Gas Utility Accountants, New Jefferson Hotel, St. Louis, Mo.
27-29	Chamber of Commerce of the U. S. A., Washington, D. C.

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Farm Section, E. C. EASTER.....Alabama Power Co., Birmingham, Ala.
Industrial Power and Heating Section, J. R. HARTMAN.....The Cincinnati Gas & Electric Co., Cincinnati, Ohio
Residential Section, J. M. STEDMAN.....Pennsylvania Power & Light Co., Allentown, Pa.
Sales Personnel and Training, R. S. BELL.....The Commonwealth & Southern Corp., New York, N. Y.
Wiring and Specifications, R. F. HARTENSTEIN.....Ohio Edison Co., Akron, Ohio

ENGINEERING

Engineering Division General, P. H. CHASE.....Philadelphia Electric Co., Philadelphia, Pa.
Electrical Equipment, CHESTER A. CORNEY.....Boston Edison Co., Boston, Mass.
Hydraulic Power, G. R. STRANDBERG.....Stone & Webster Engineering Corp., Boston, Mass.
Meter and Service, W. G. KNICKERBOCKER.....The Detroit Edison Co., Detroit, Mich.
Prime Movers, G. C. DANIELS.....The Commonwealth & Southern Corp., Jackson, Mich.
Transmission and Distribution, THOMAS J. BROSNAN.....Buffalo Niagara Electric Corp., Buffalo, N. Y.

GENERAL

Accident Prevention, E. J. KREH.....Duquesne Light Co., Pittsburgh, Pa.
Industrial Relations, C. B. BOULET.....Wisconsin Public Service Corp., Milwaukee, Wis.
Insurance, I. M. CARPENTER.....Ebasco Services Inc., New York, N. Y.
Membership, J. F. FOGARTY.....The North American Co., New York, N. Y.
Purchasing and Stores, R. S. KING.....Union Electric Company of Missouri, St. Louis, Mo.
Prize Awards, H. M. SAWYER.....American Gas & Electric Service Corp., New York, N. Y.
Rate Research, E. N. STRAIT.....Public Utility Engineering & Service Corp., Chicago, Ill.
Statistical, WINSOR MARTIN.....Public Utility Engineering & Service Corp., Chicago, Ill.
Transportation, JEAN Y. RAY.....Virginia Electric & Power Co., Richmond, Va.
Codes and Standards (a Subcommittee of the Board of Directors), H. B. BRYANS..Philadelphia Electric Co., Philadelphia, Pa.

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